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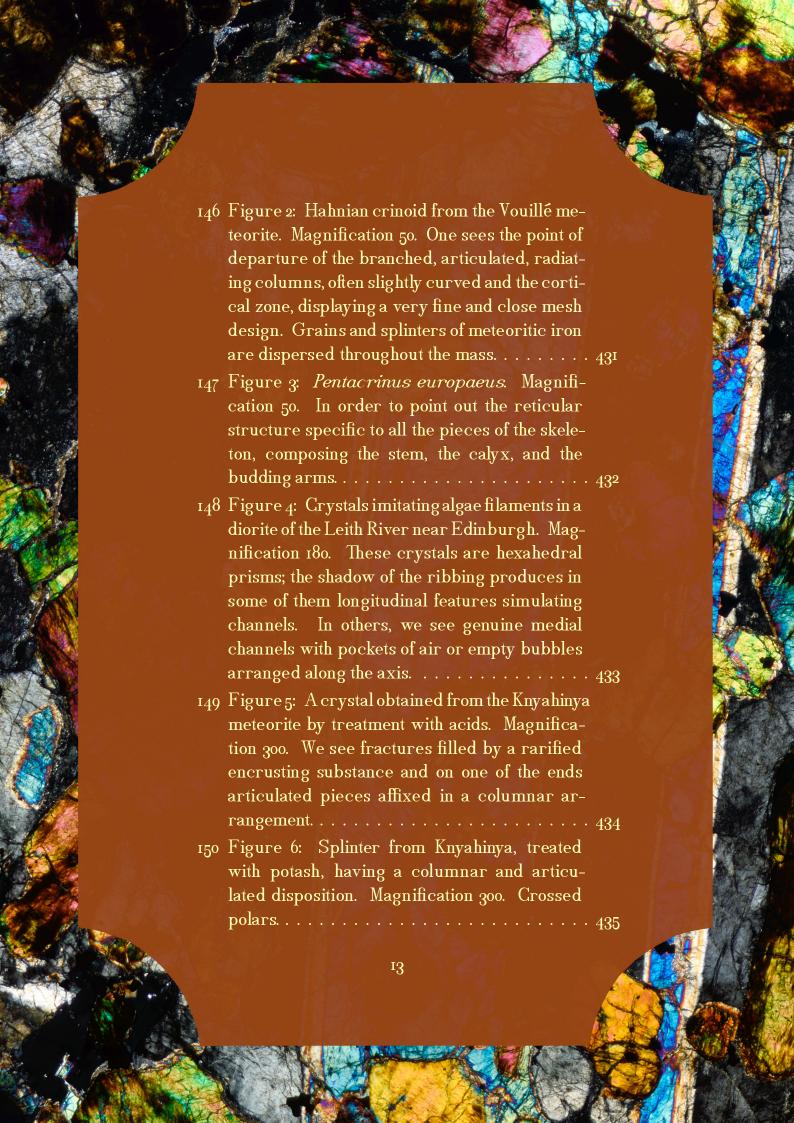














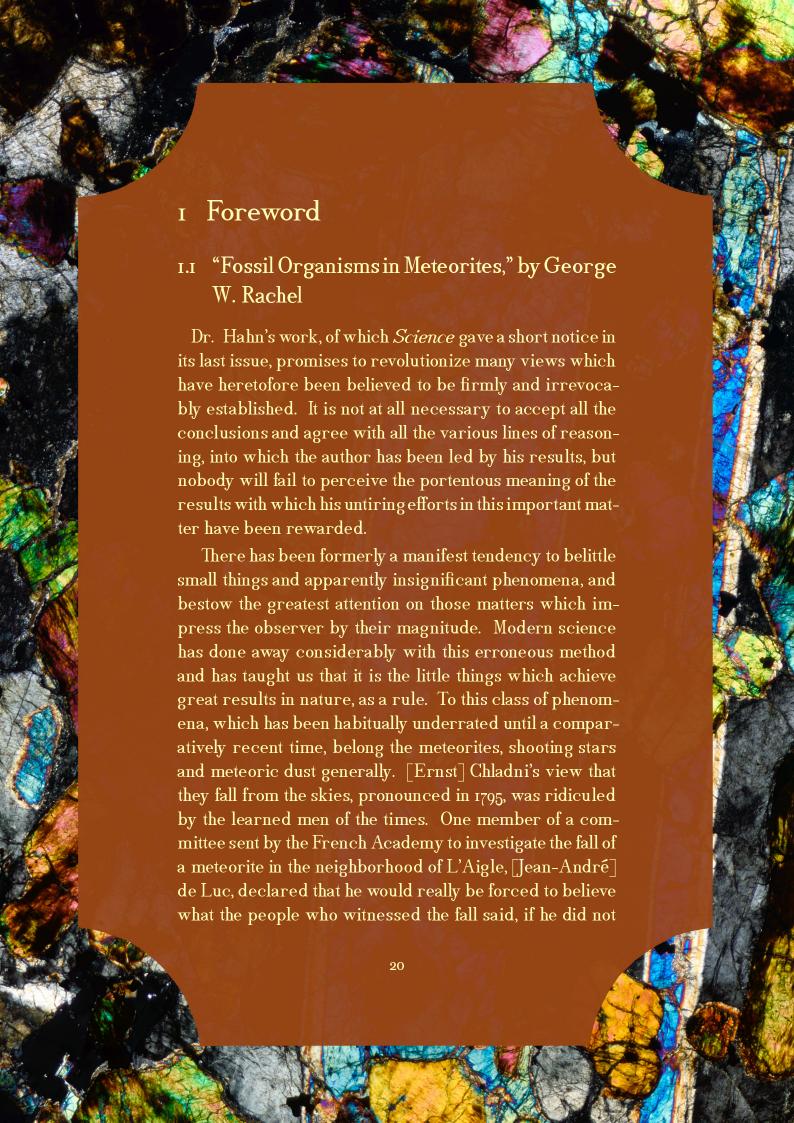


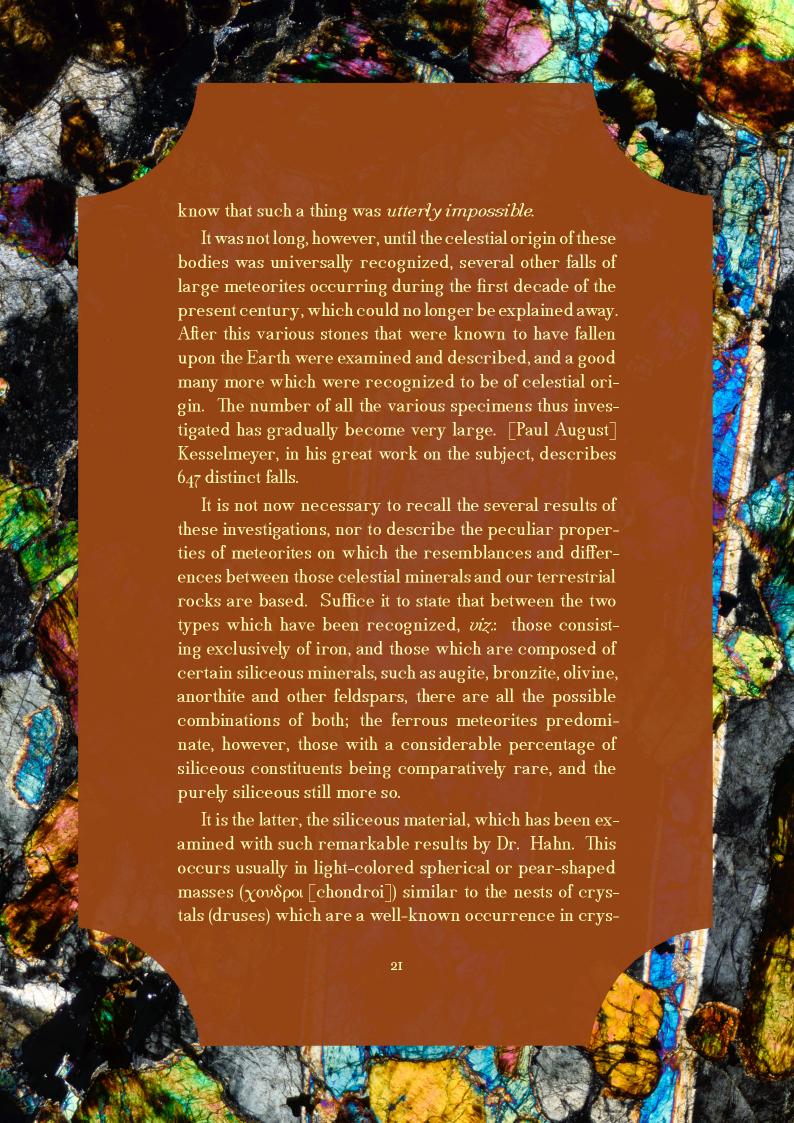


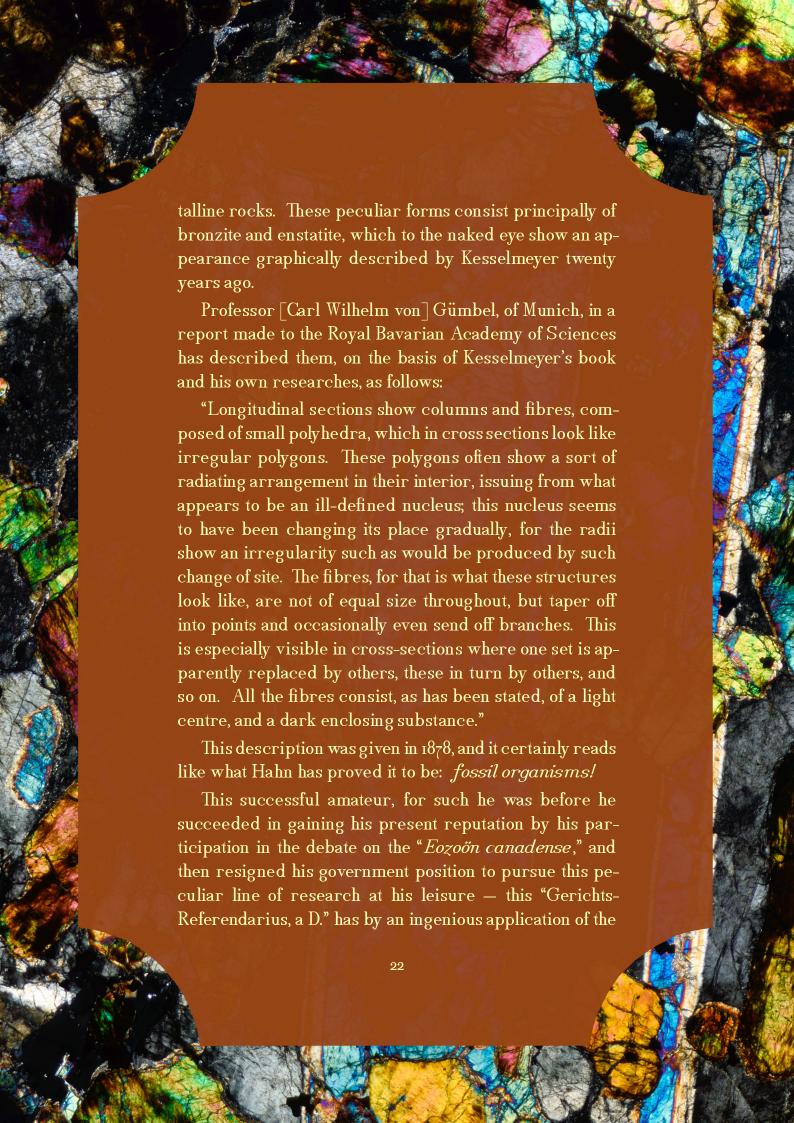


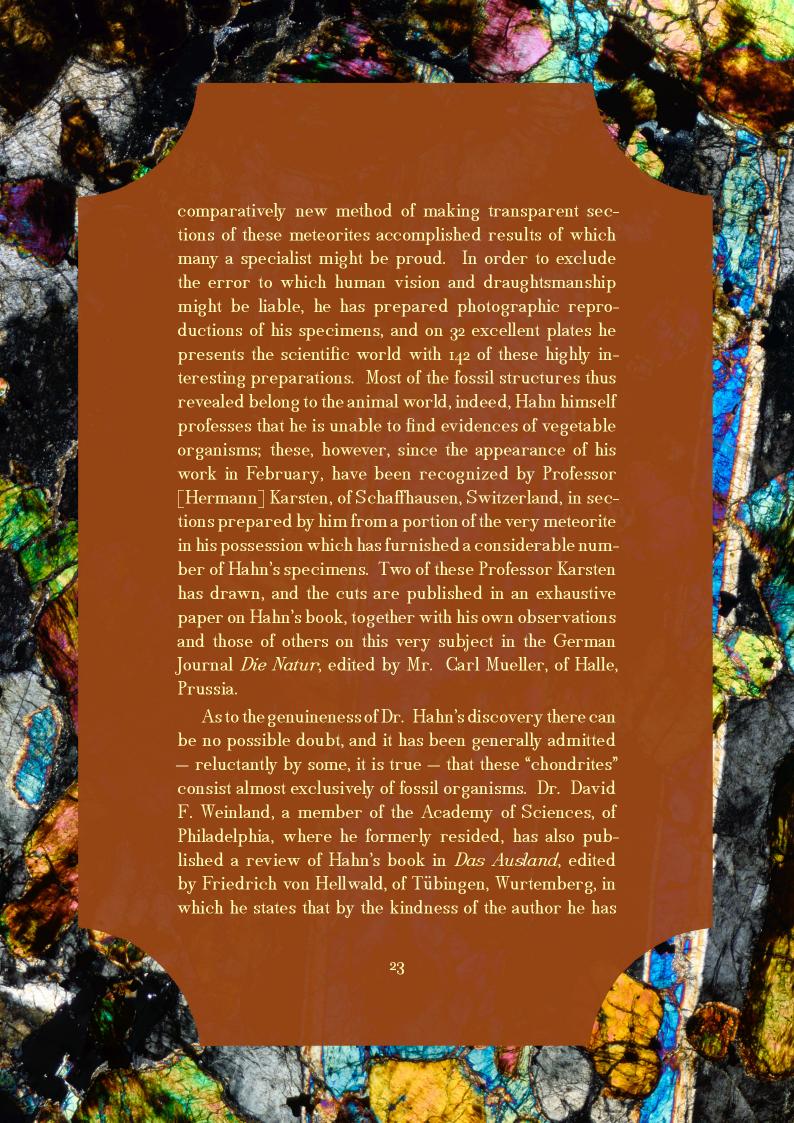








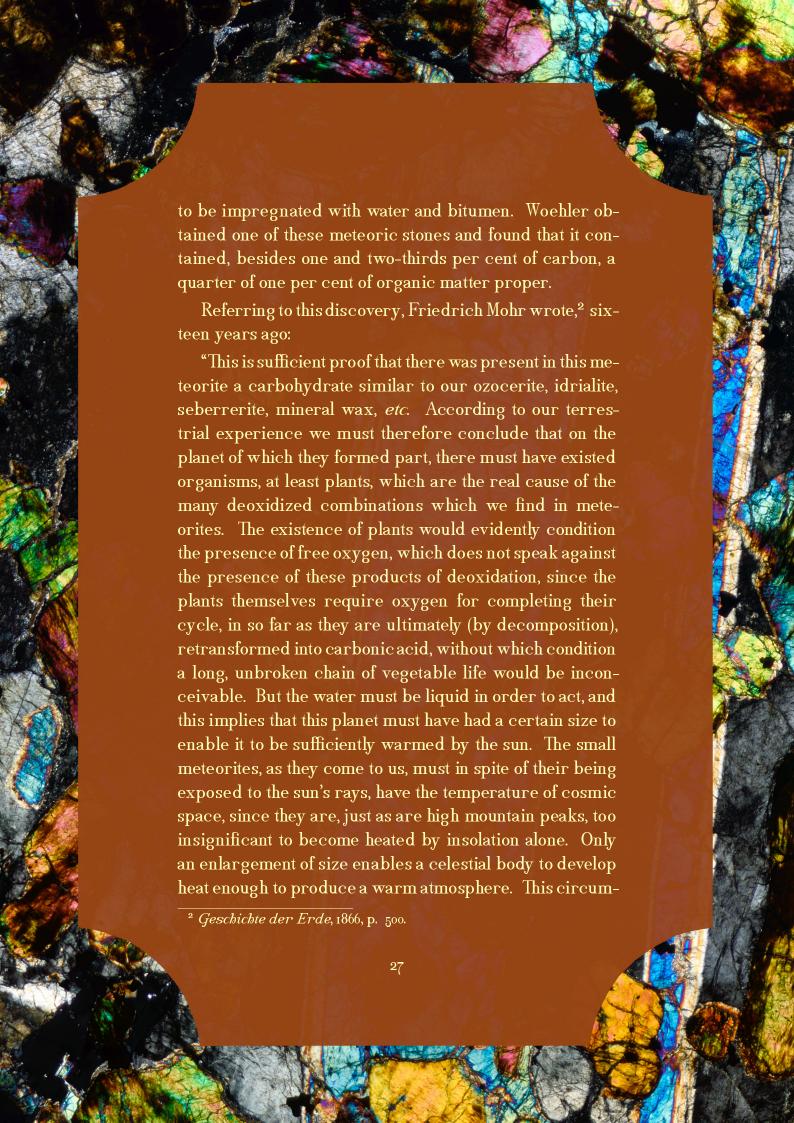


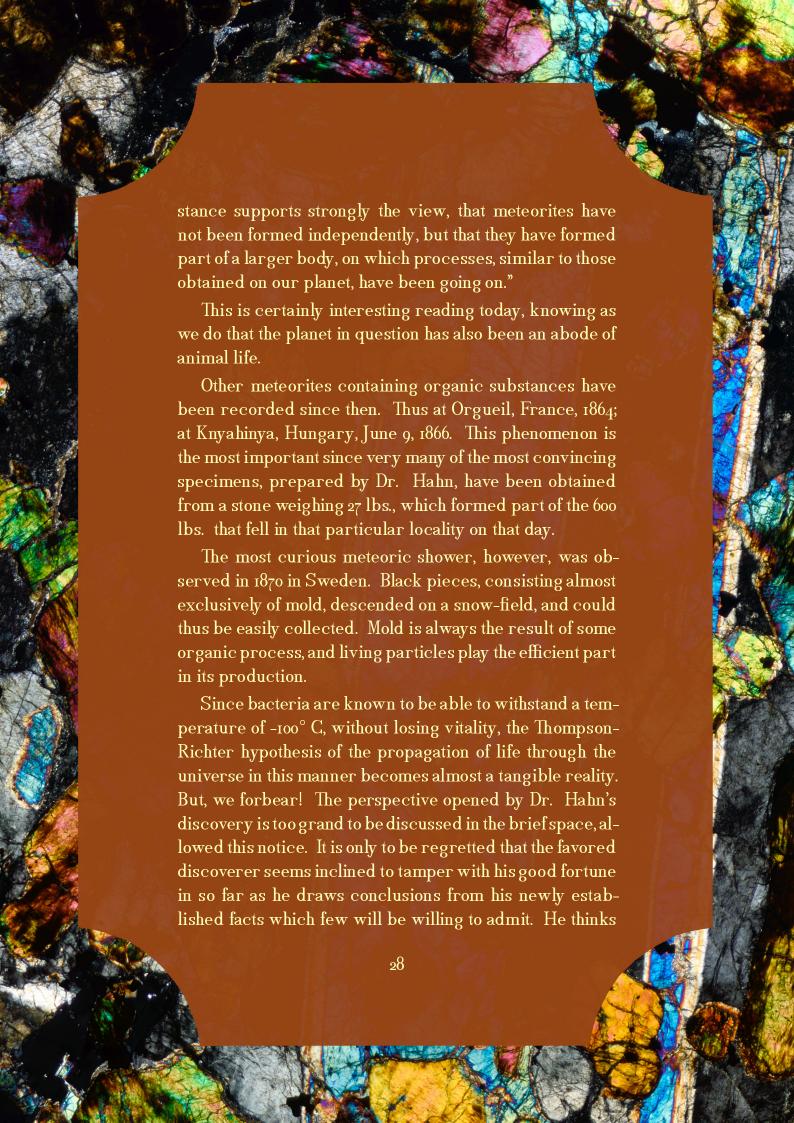


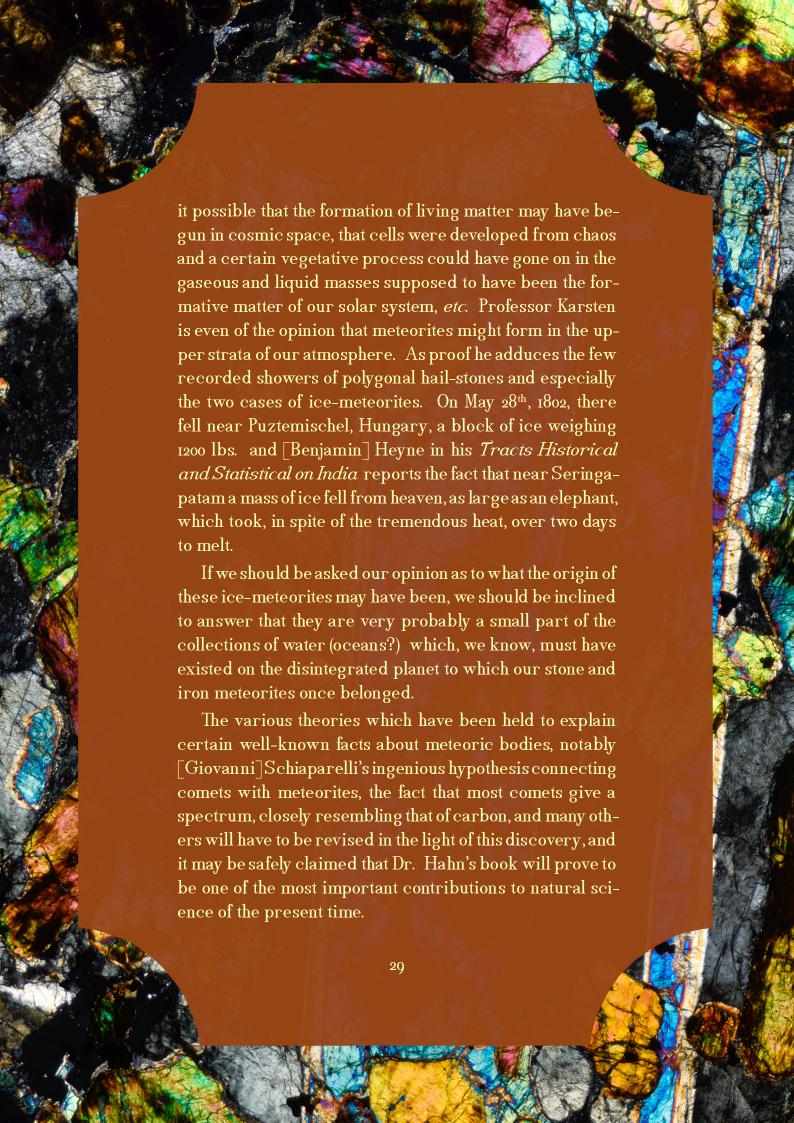
had the opportunity of examining these specimens, and although this examination has not given exactly the same results in regard to the determination of the particular kind of organism, he cheerfully admits that they are organisms, and this fact will not be doubted by any one who scans the plates published by Dr. Hahn. In a postscript to this review, Dr. Weinland informs the reader that the author has entrusted to him the difficult task of classifying all the fossil organisms in more than three hundred of his specimens — of which Hahn has prepared over six hundred — and Dr. Weinland who is a competent naturalist, gives a few of his preliminary results. He compares the material which these sections display to the detritus of which the youngest coral lime and sandstone (coralline crag) consist such as is found on the shores of the Mexican Gulf. He furthermore states that complete forms are rarely found, but that the material is sufficiently abundant to construct many complete species, in the manner usually applied to fossil remains. The number of the various species of polypi, crinoids, sponges; and algae which are united by a siliceous material, Dr. Weinland estimates after a cursory examination at about fifty. One of the corals is set down by various observers a resembling to the Favosites goldfussi from the Silurian Grauwacke, another is compared to the Calamopora naumanni from the same strata. The structure of these corals is excellently preserved; the columnar structure, the stomata, the rays in the cells, <sup>1</sup> A drawing of this fossil coral is given by Dana in his Textbook on Geology, Ed. 1868, p. 111. 24

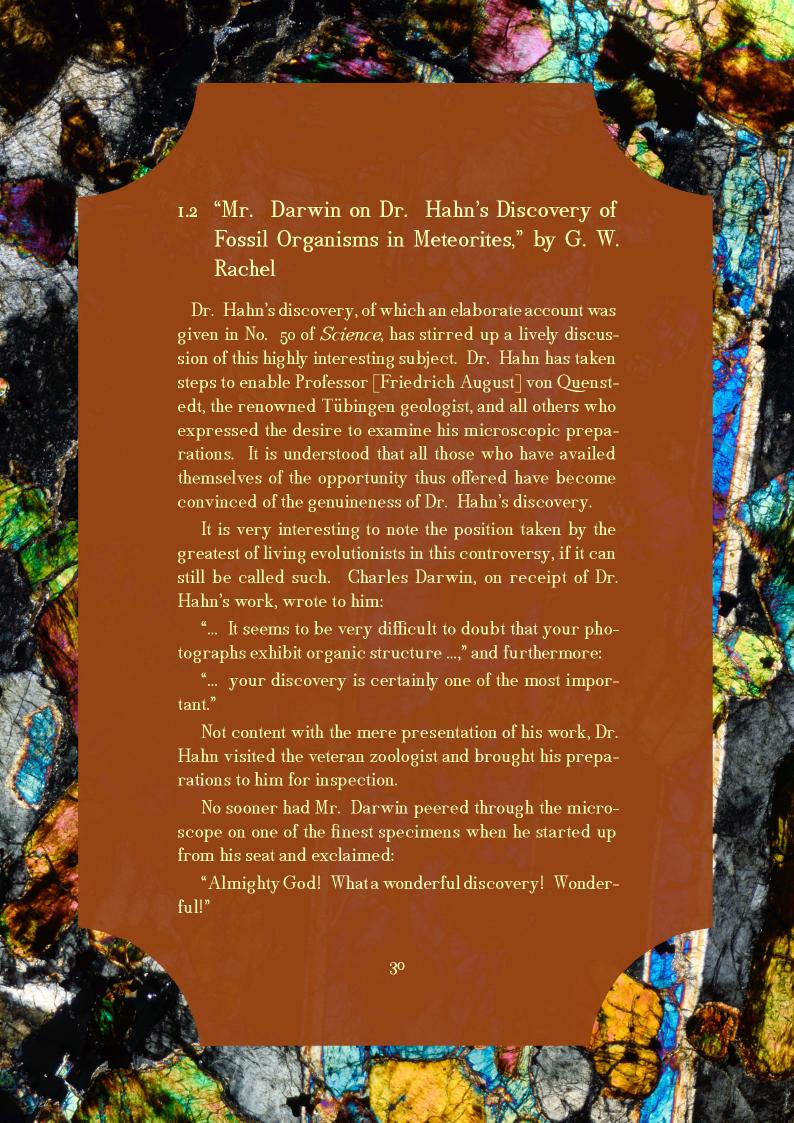


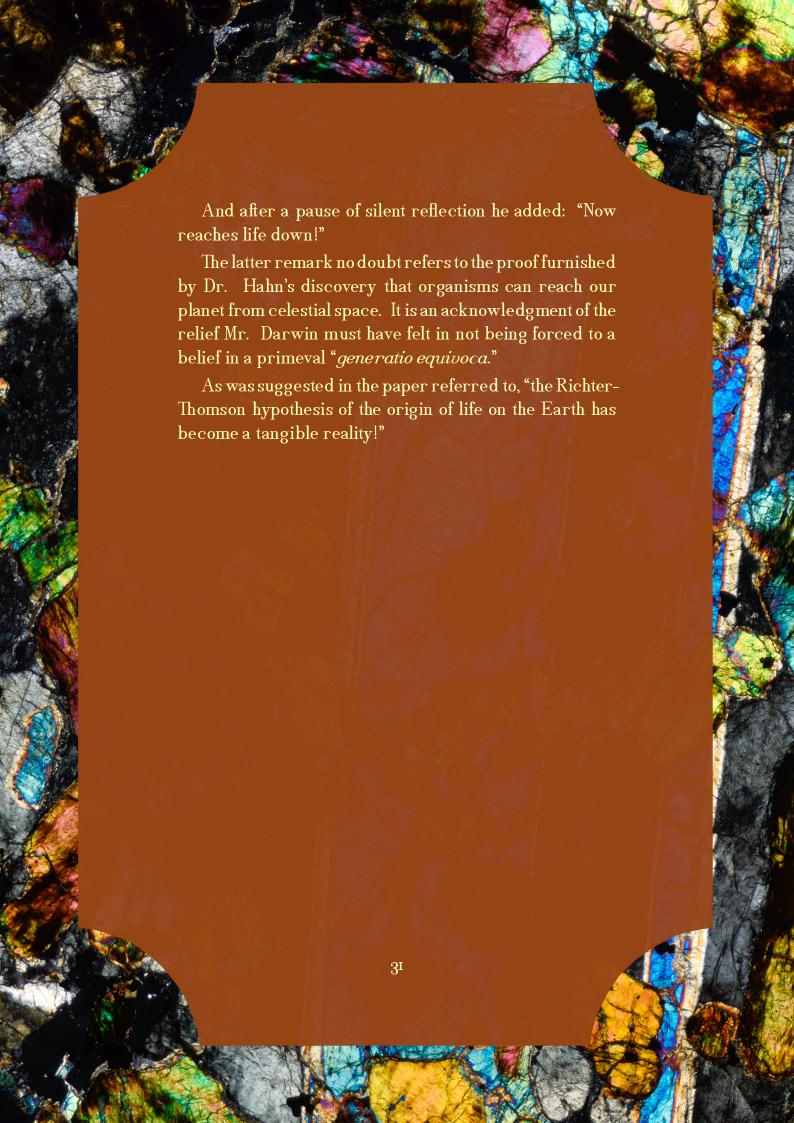


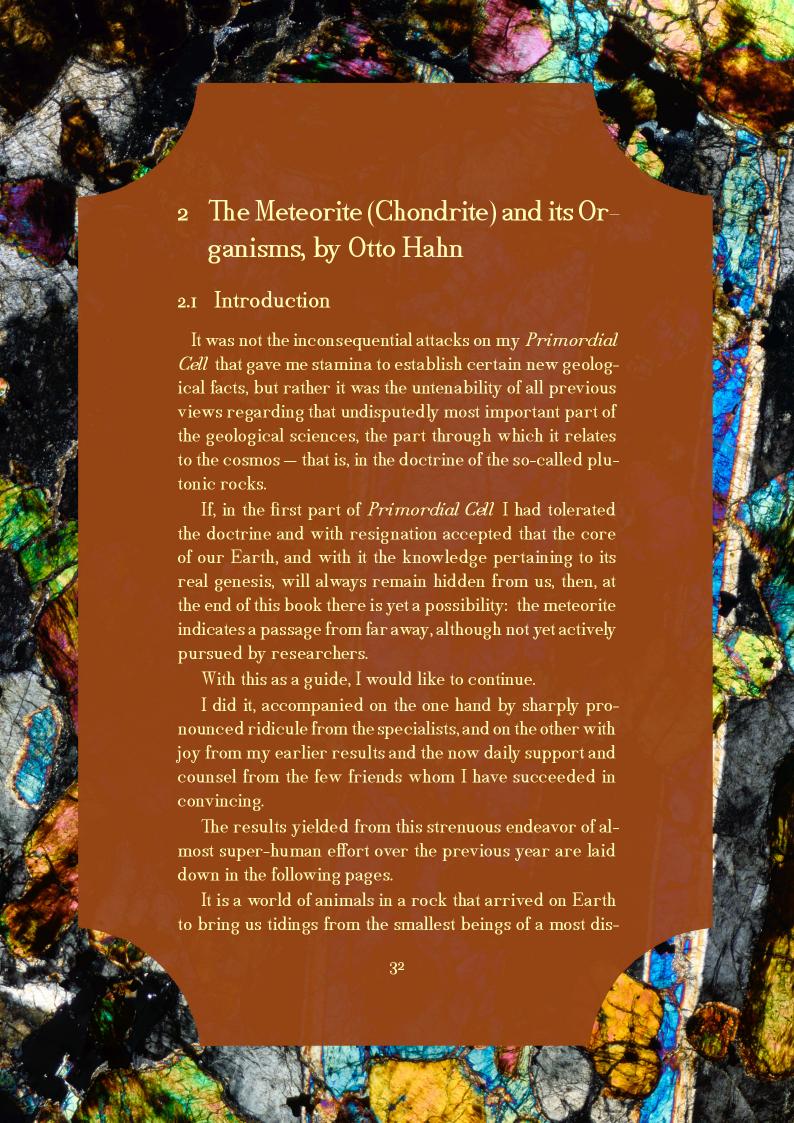




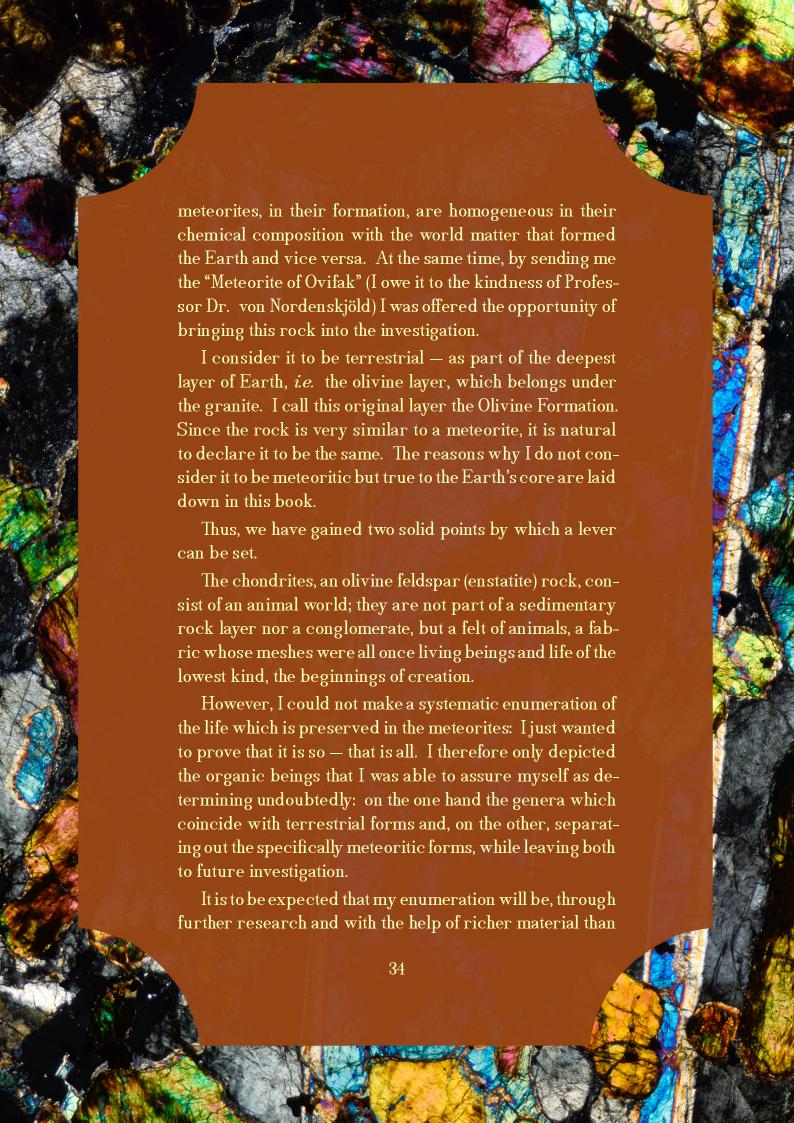


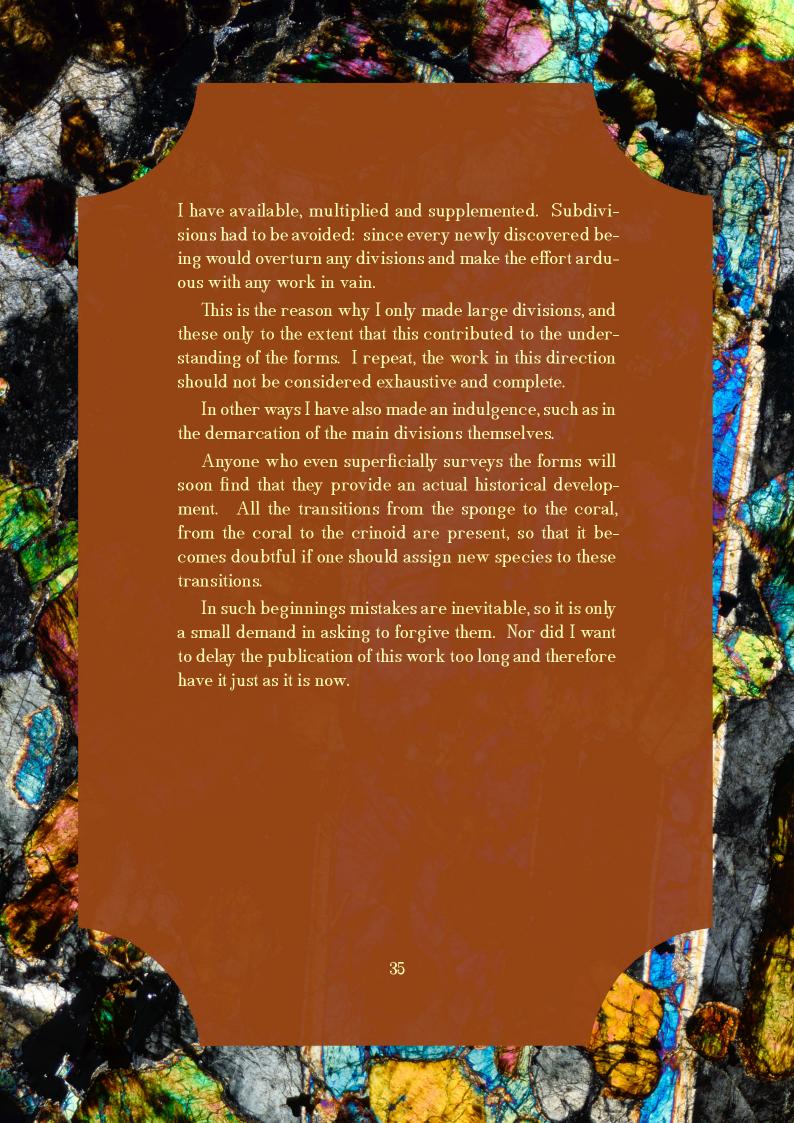


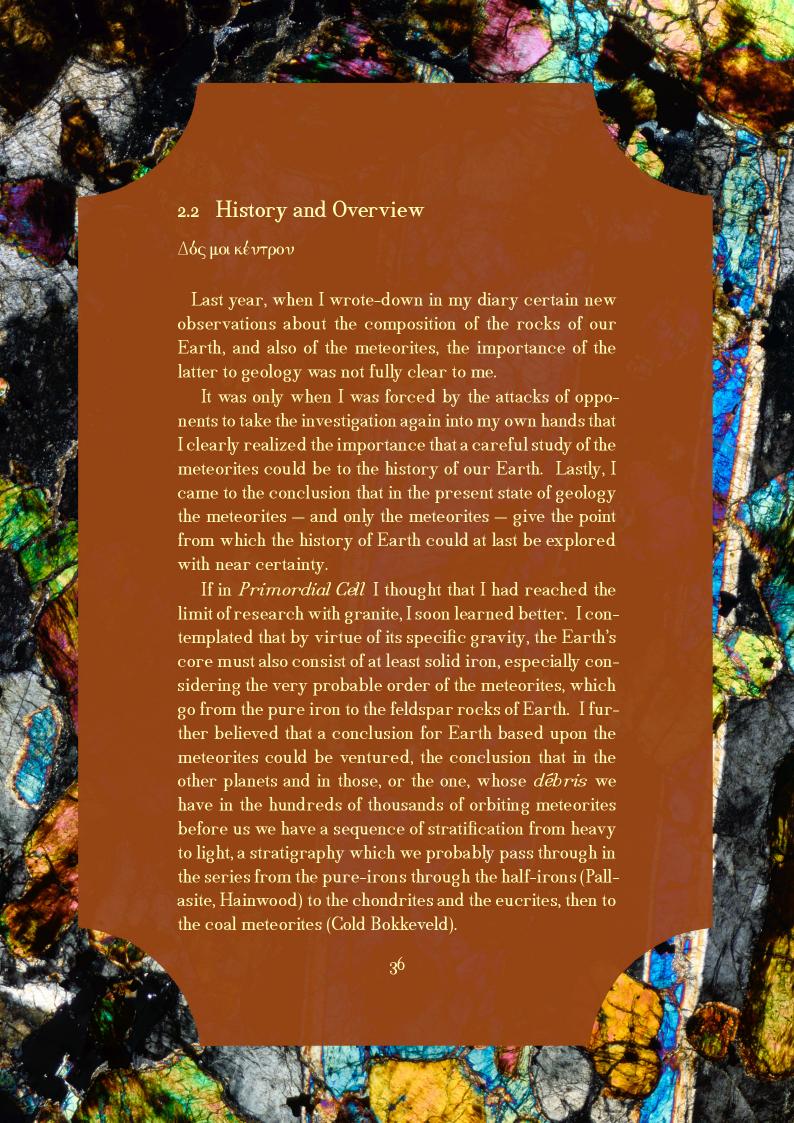




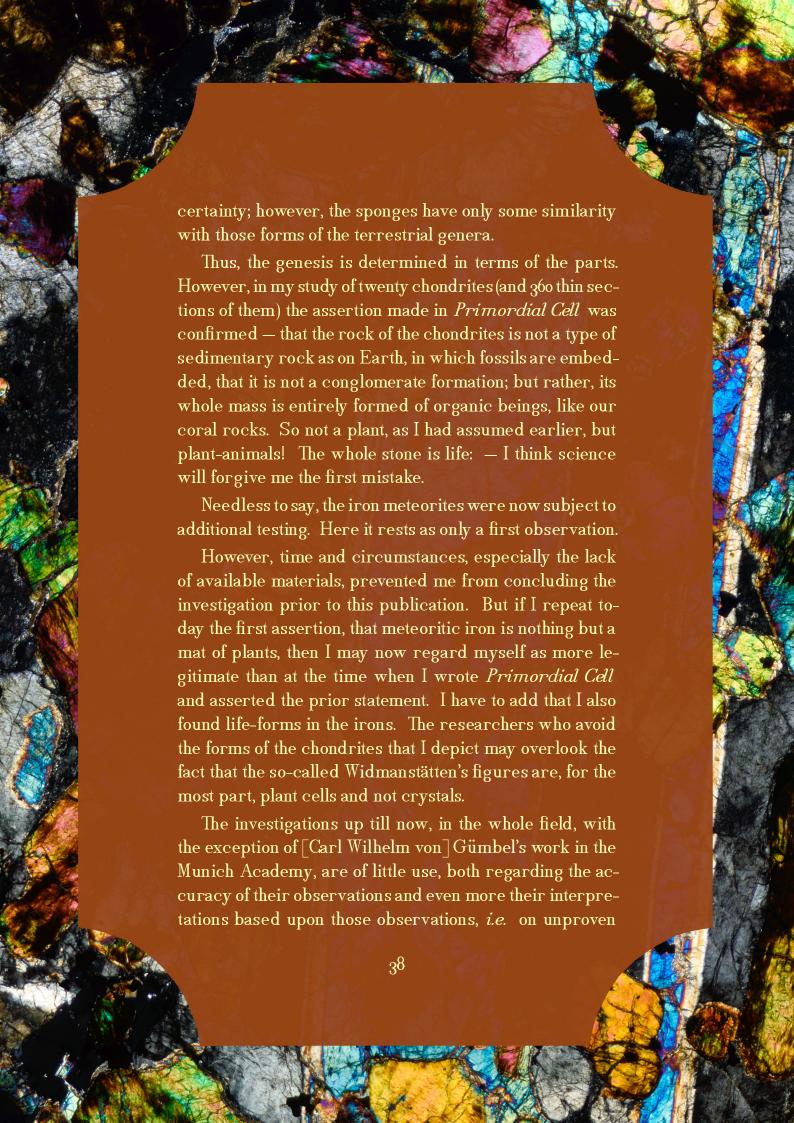
tant place — a life-world which a mortal eye could hardly hope to behold: a world of beings showing us the creative power that made our Earth out of a nebula and has worked universally and evenly in the universe. Admittedly, the meteorites, namely the chondrites, for these are the ones which are preferentially subject to my investigations, contain no life of higher construction; rather, all are lower life forms — the same ones which prevail in the Silurian strata — sponges, corals, and crinoids — it is with these species that similar characteristics are found. The chondrites that I have studied are olivine enstatite rock. They have undergone alterations, although not considerable, since the time of their formation as the remains of life up until landing on Earth. They have been permeated with a silicate solution, in a similar manner to how the Jura deposits are with a solution of lime. While it was part of the parent body it probably underwent planetary cycles, just as new layers follow old ones down to the lowest strata on Earth, under the influence of which the former have undergone a certain, though not as considerable as one assumes, transformation. Only the surface of the meteorites has changed considerably, indeed, only at the last moment of their planetesimal existence and mostly due to the influence of frictional heating created, in this case, by the Earth's atmosphere. But the original meteorite itself essentially remains. We now see that before us is a piece of a planet as it was in the process of becoming, and thus the history of our Earth's body is now open to us, provided that we are correct that the 33

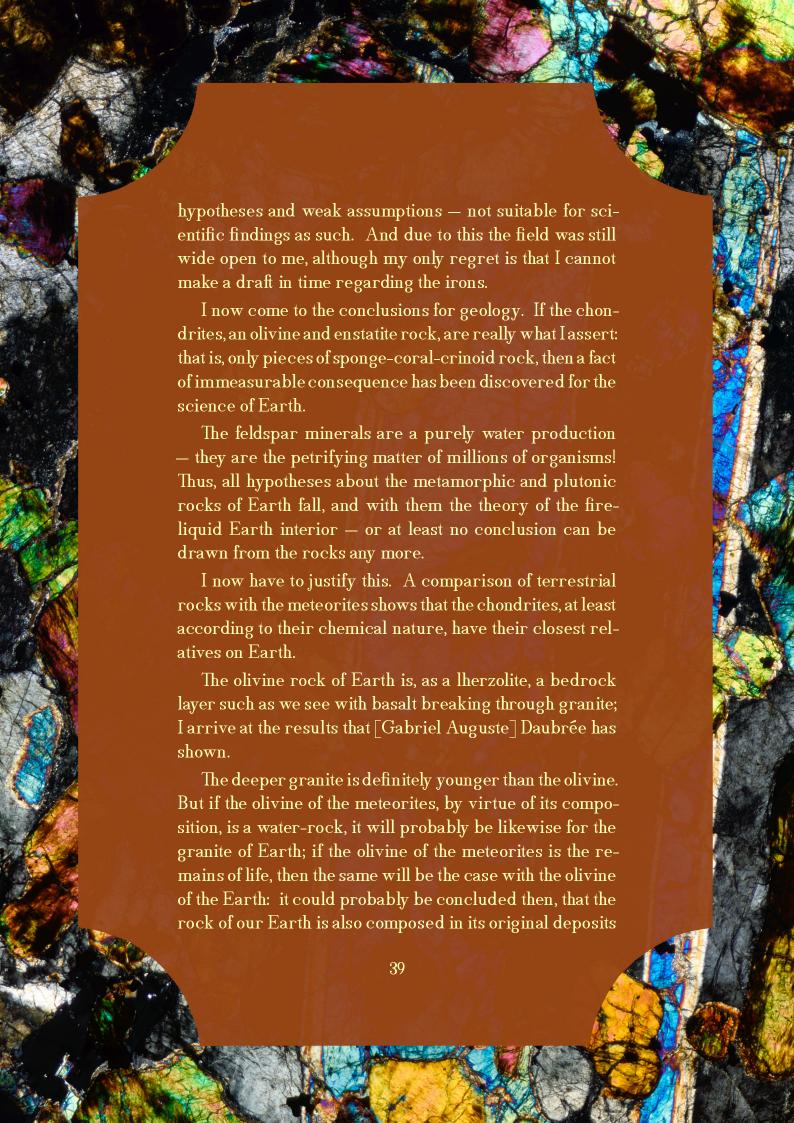


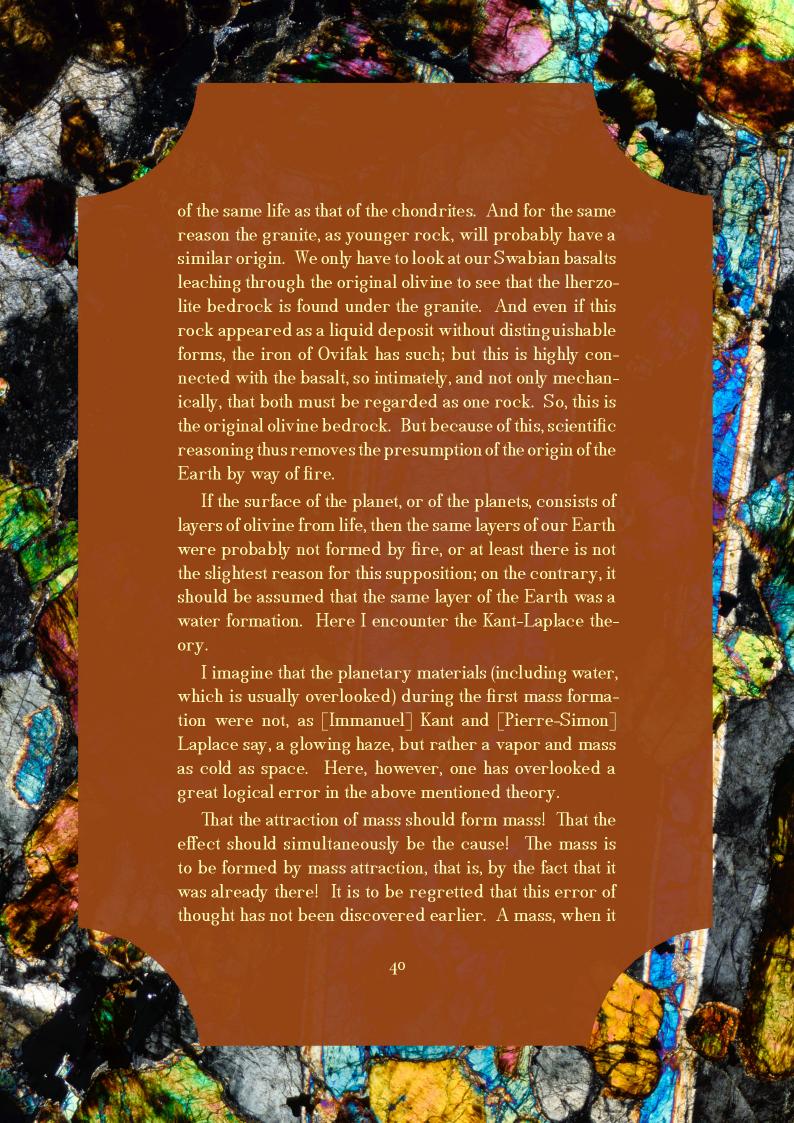


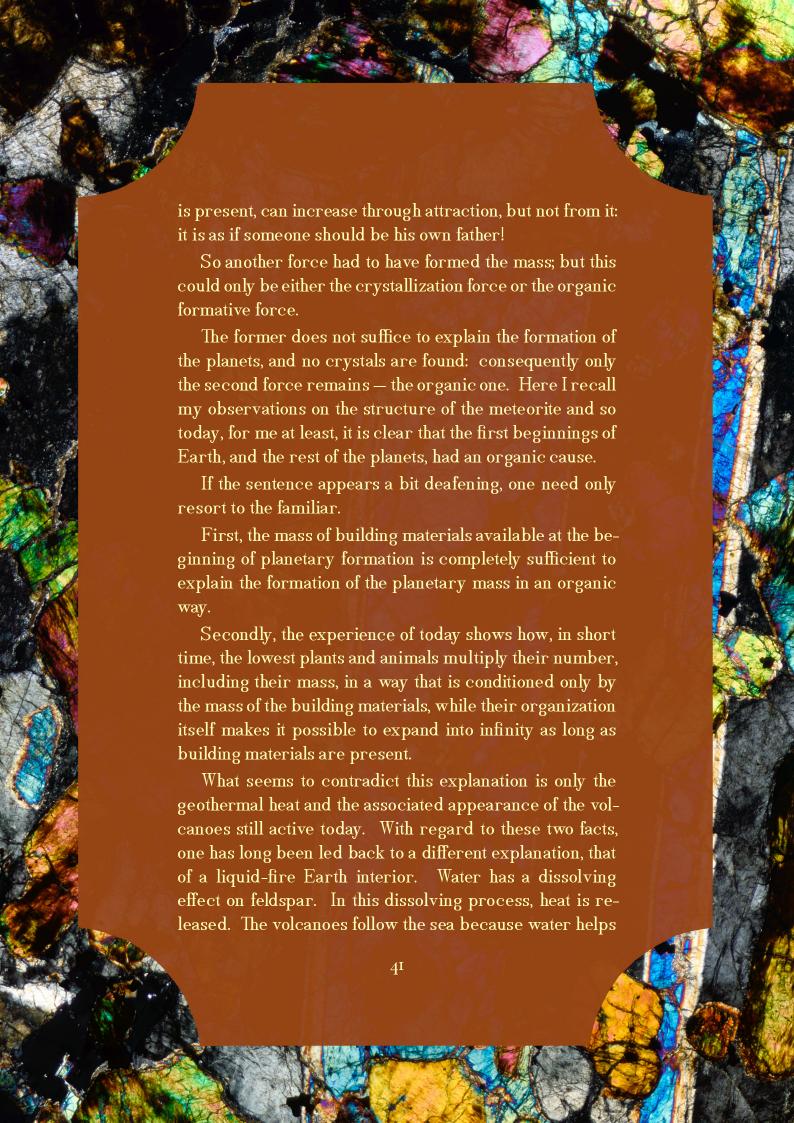


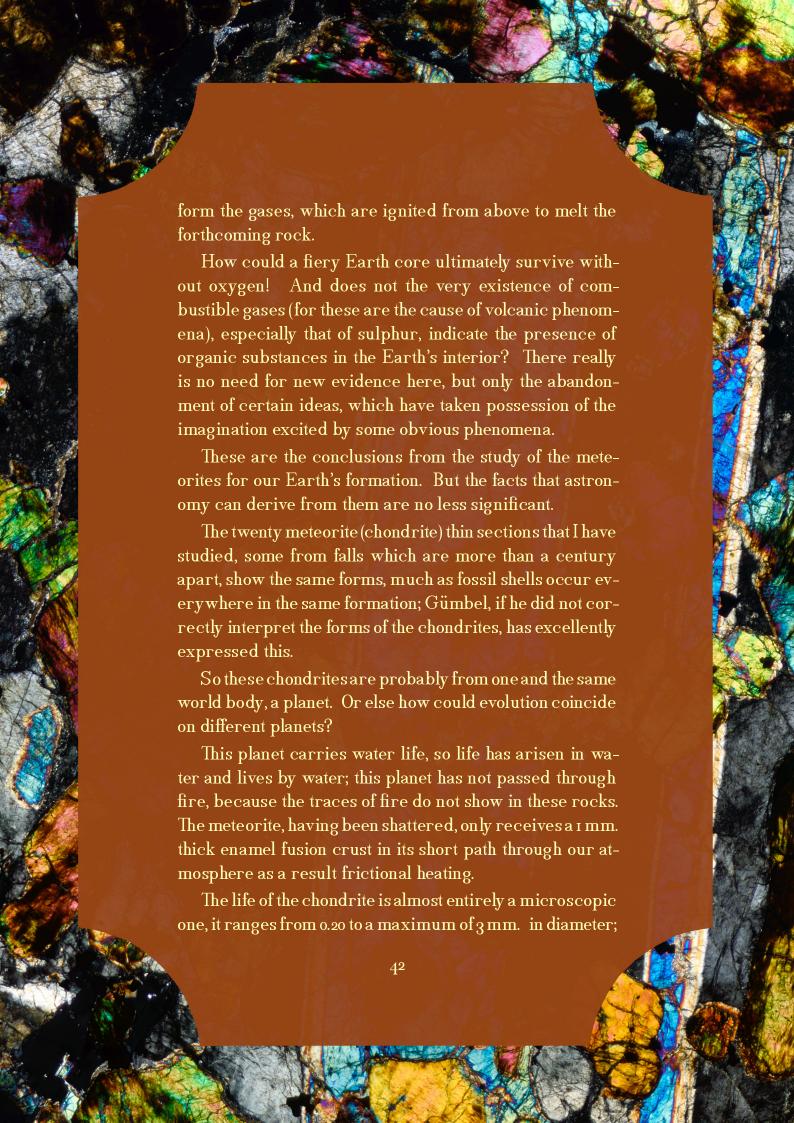




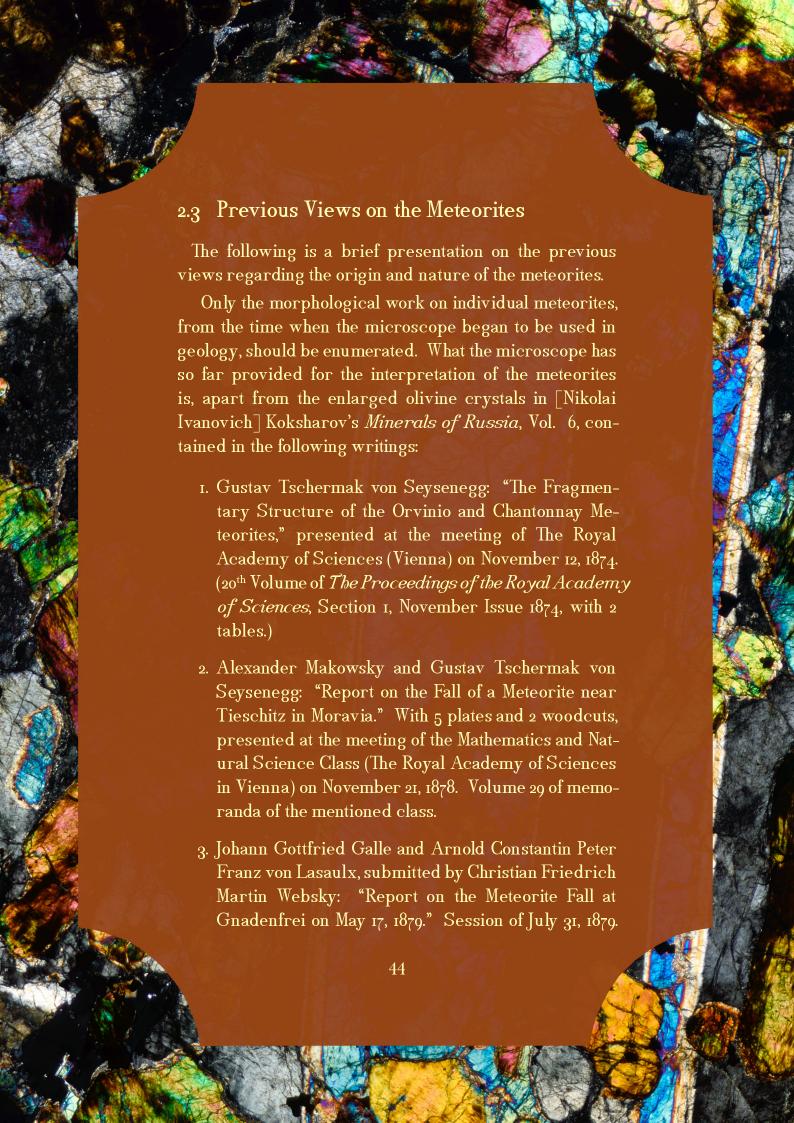




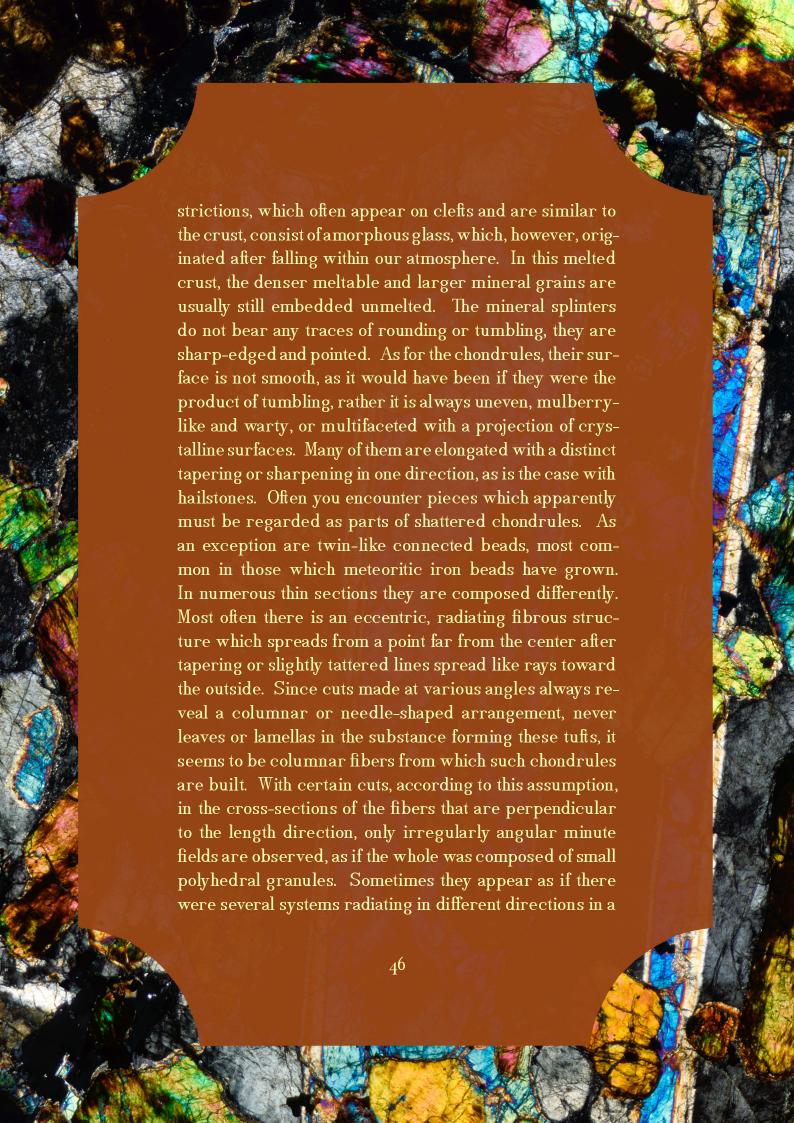


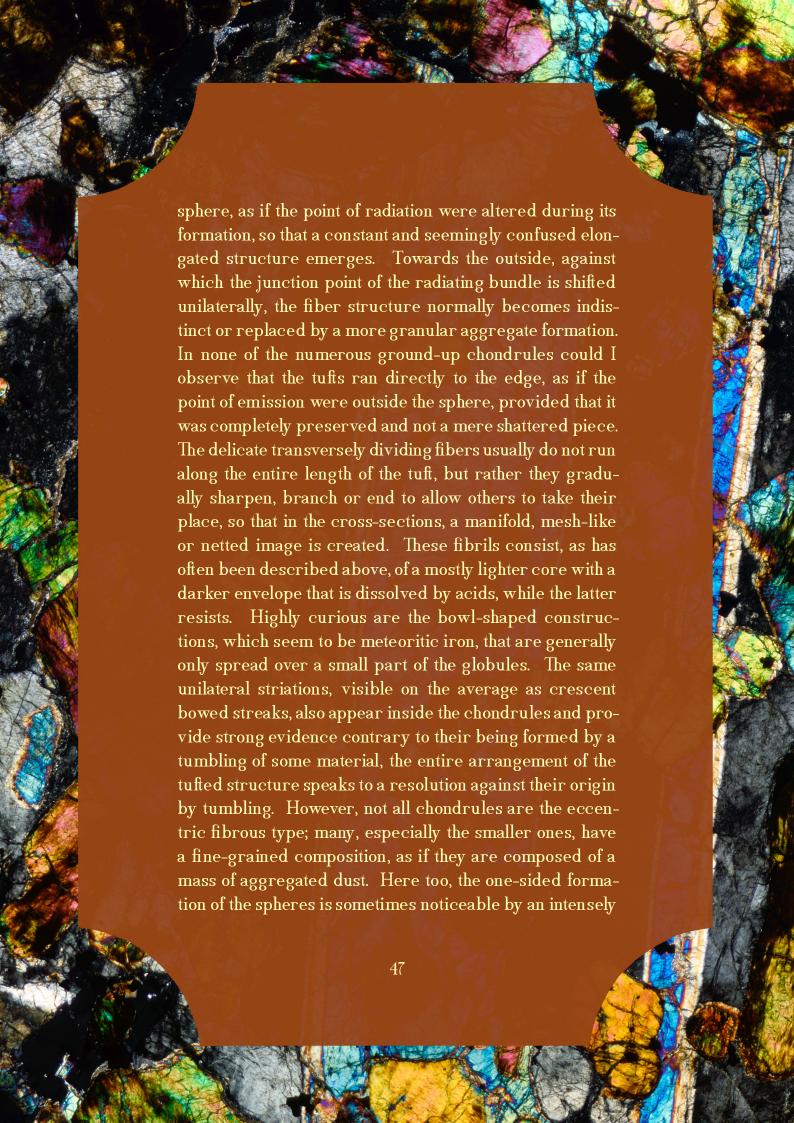


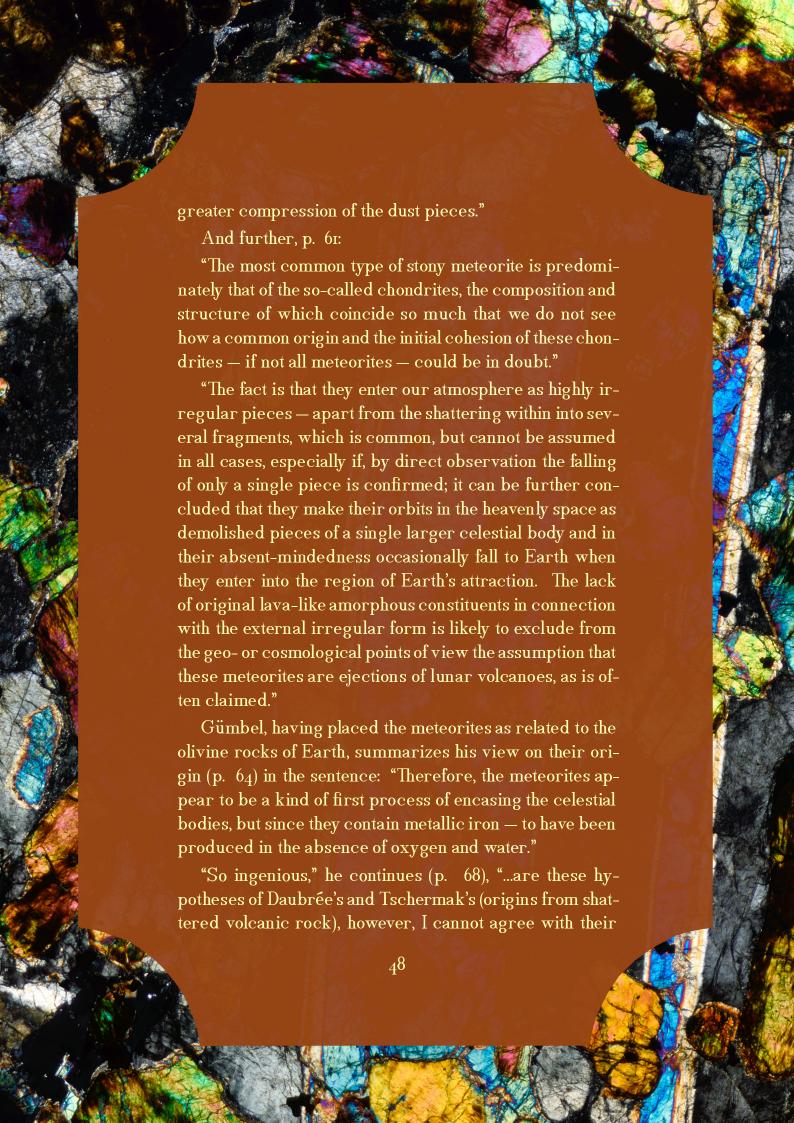




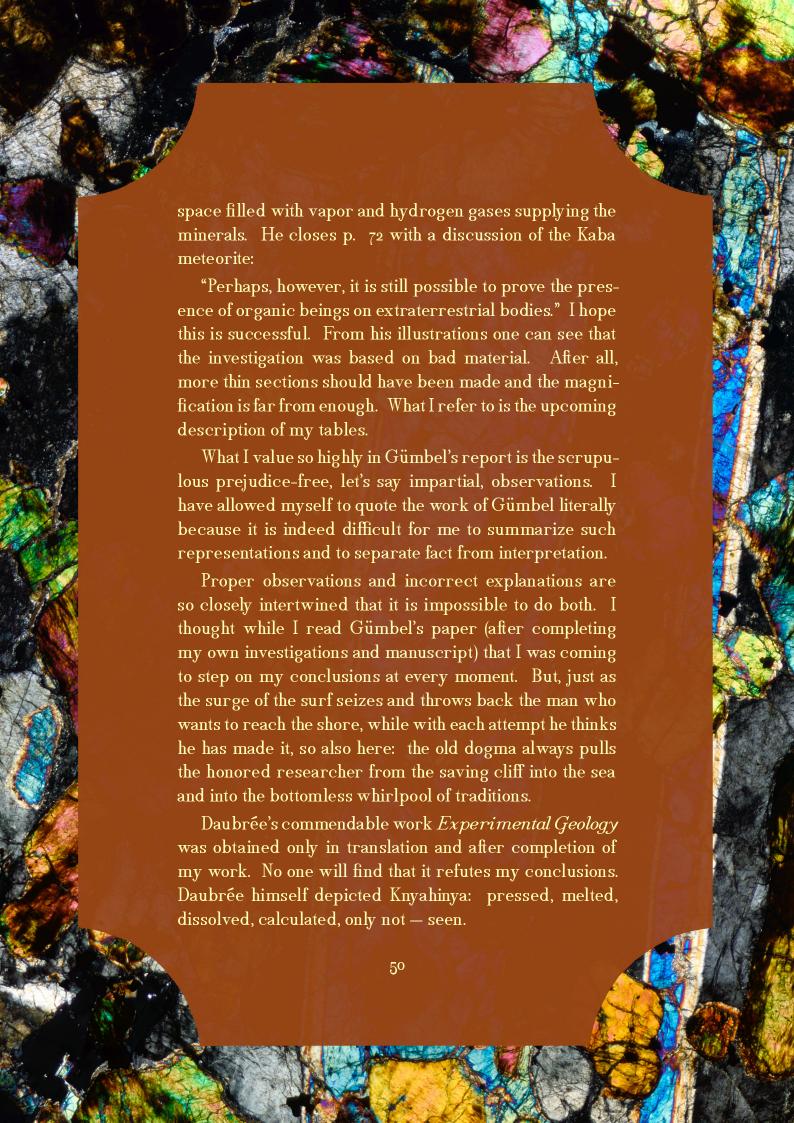


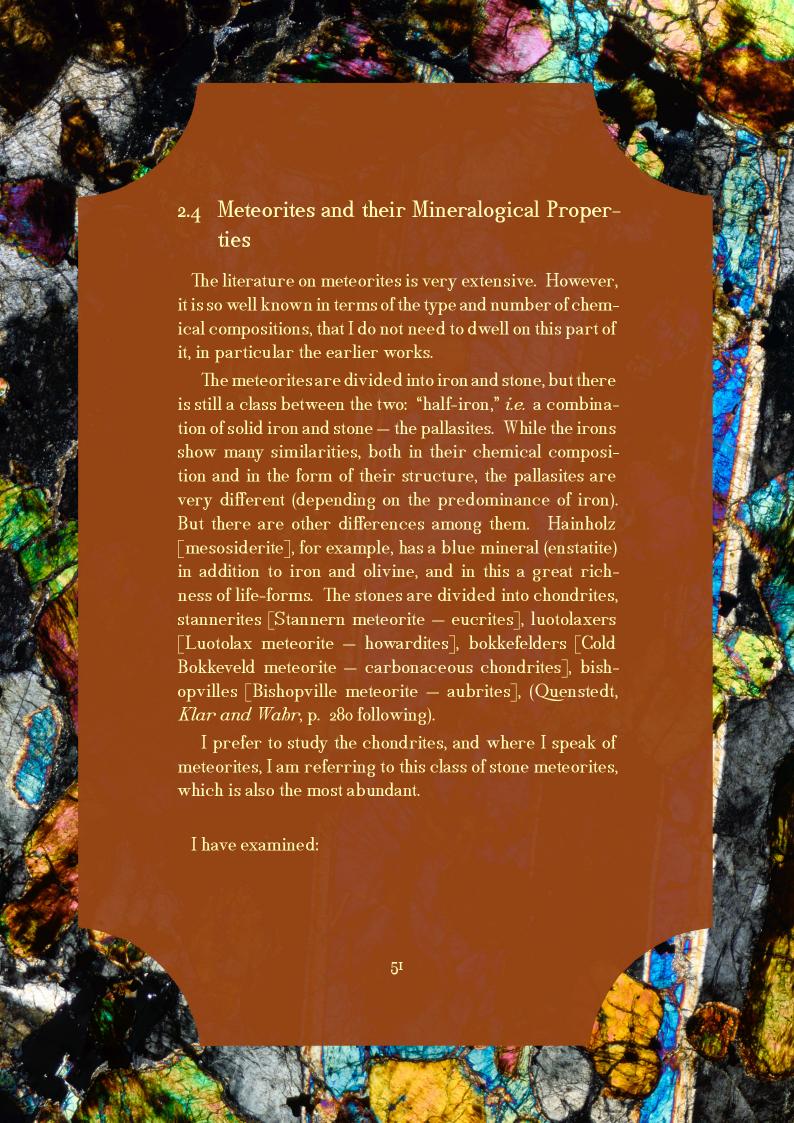




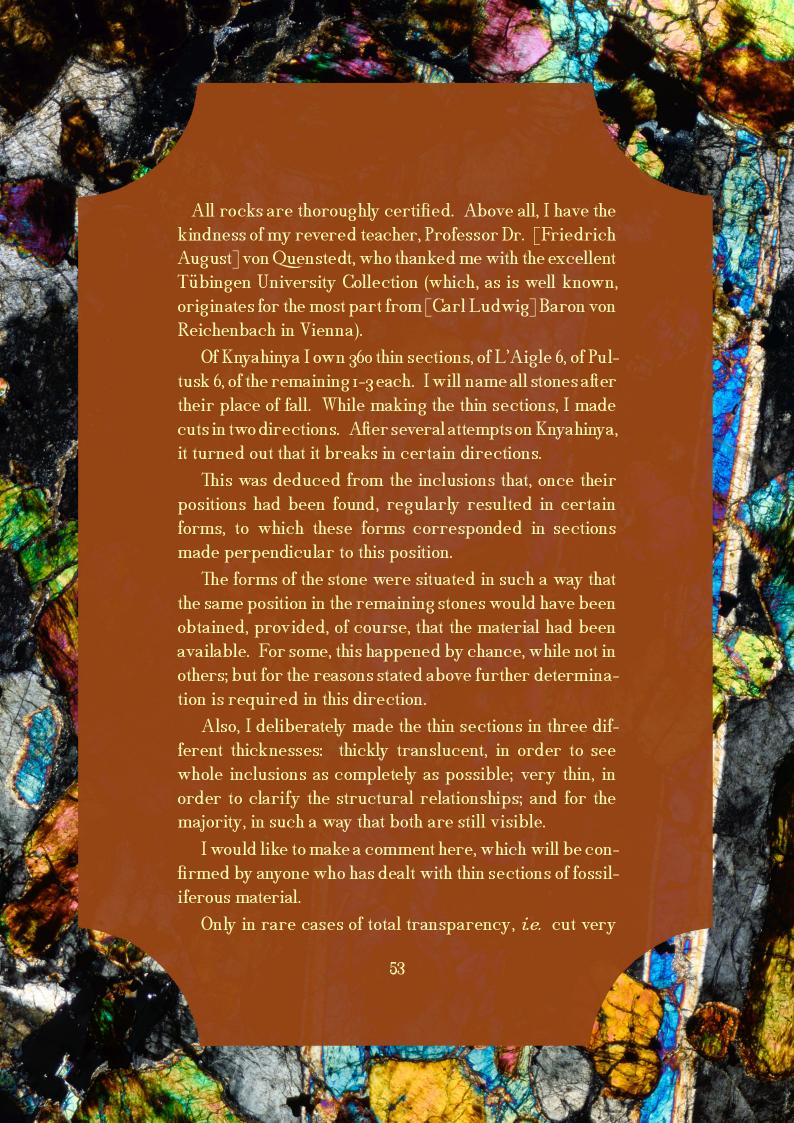


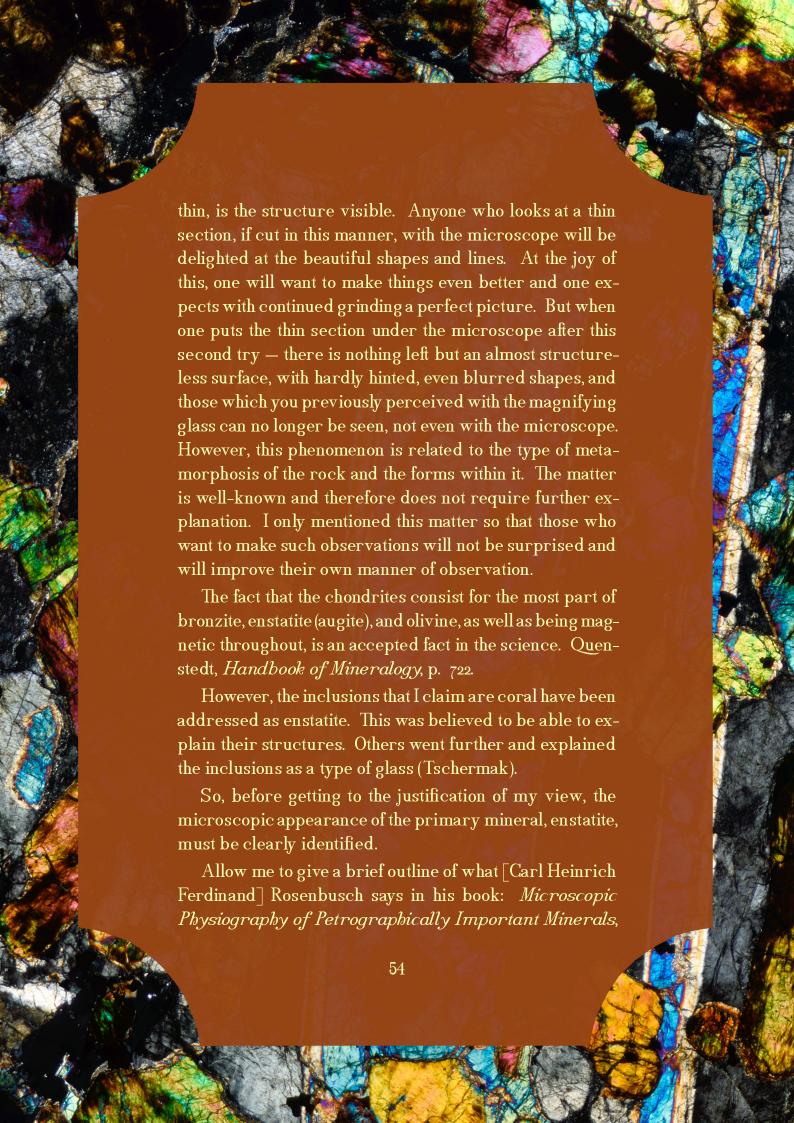


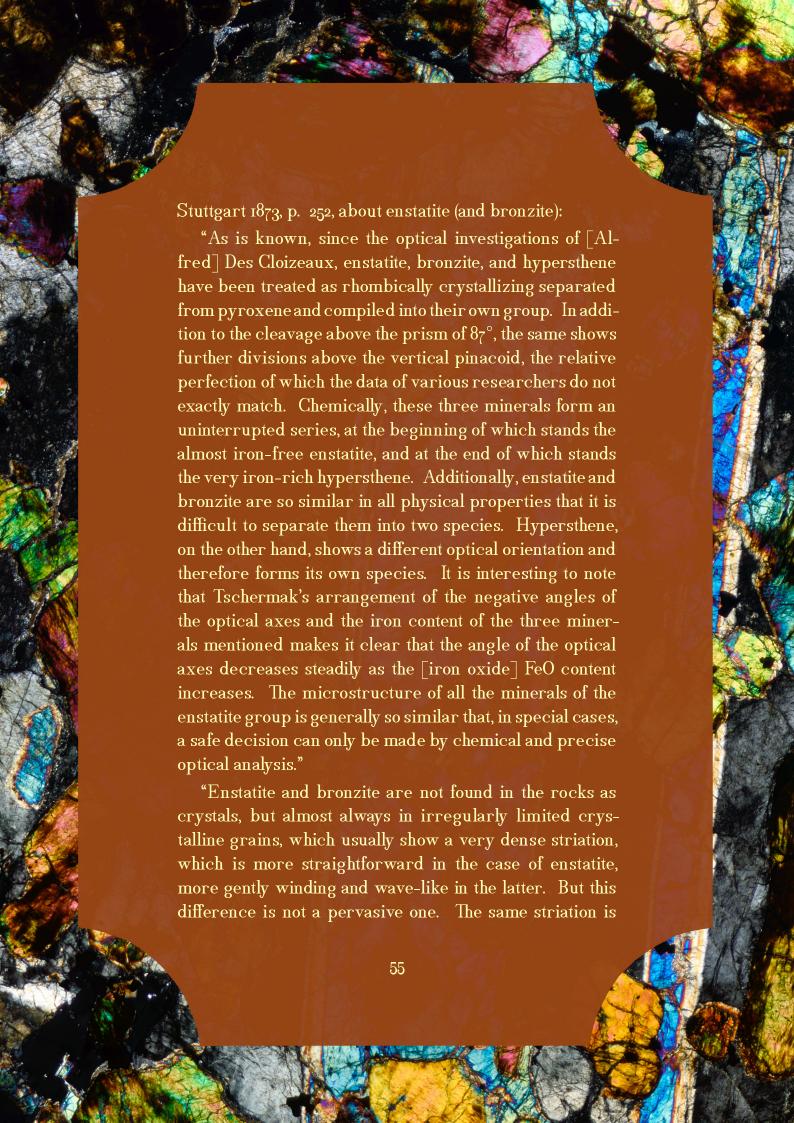


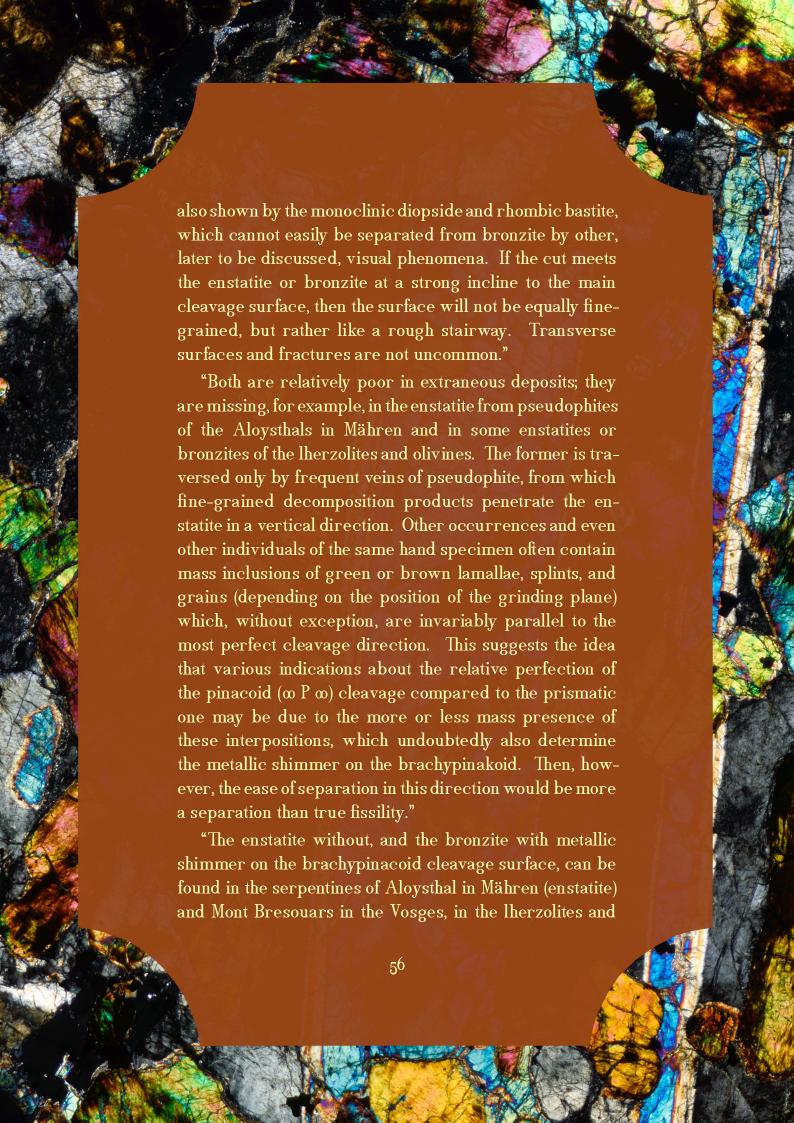


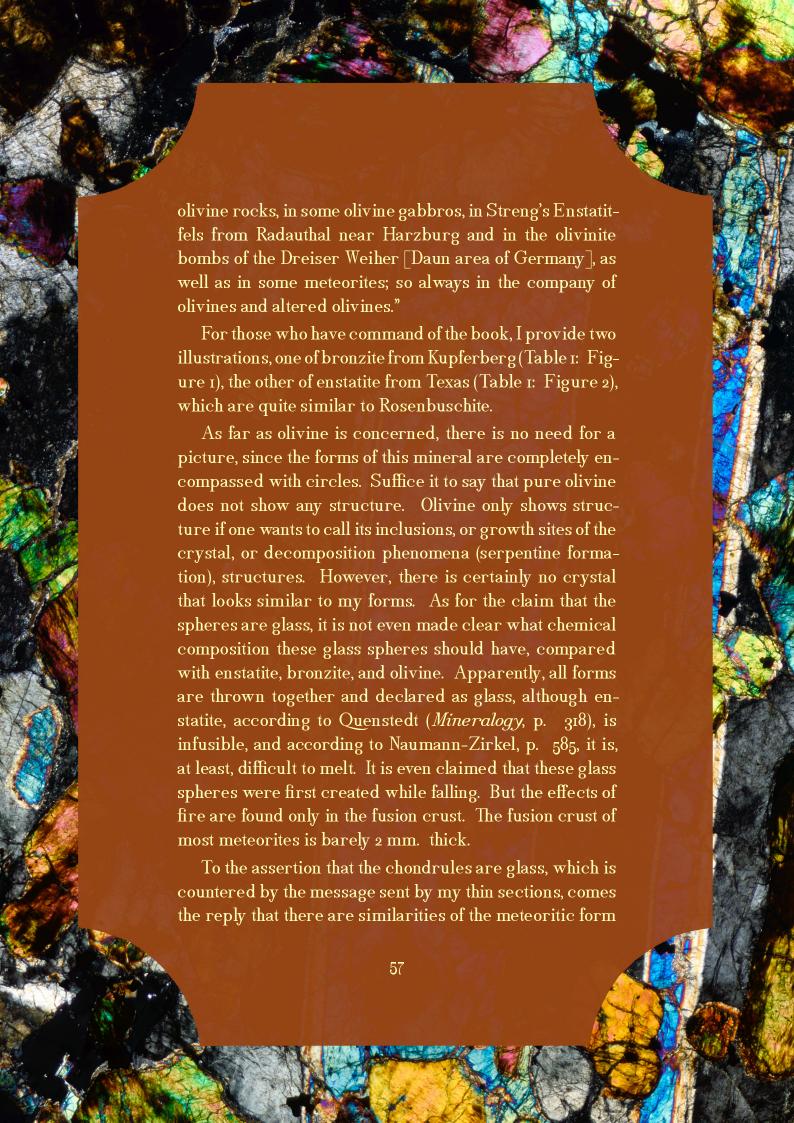


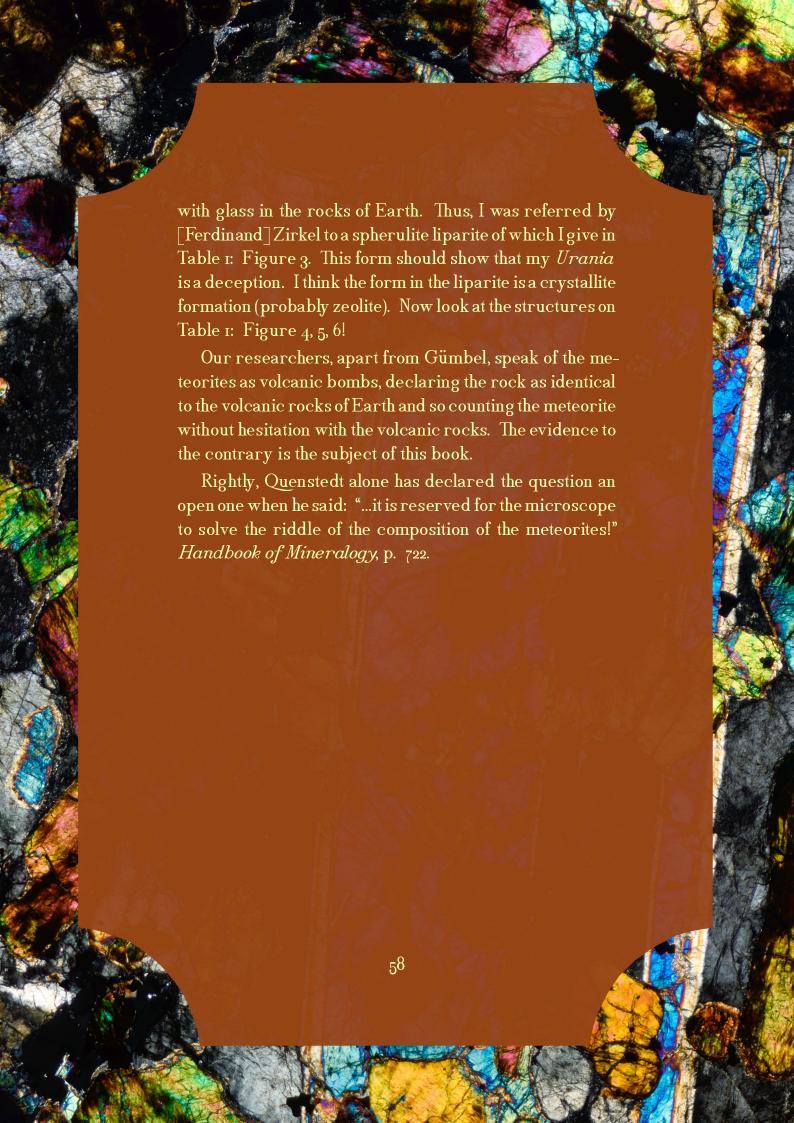


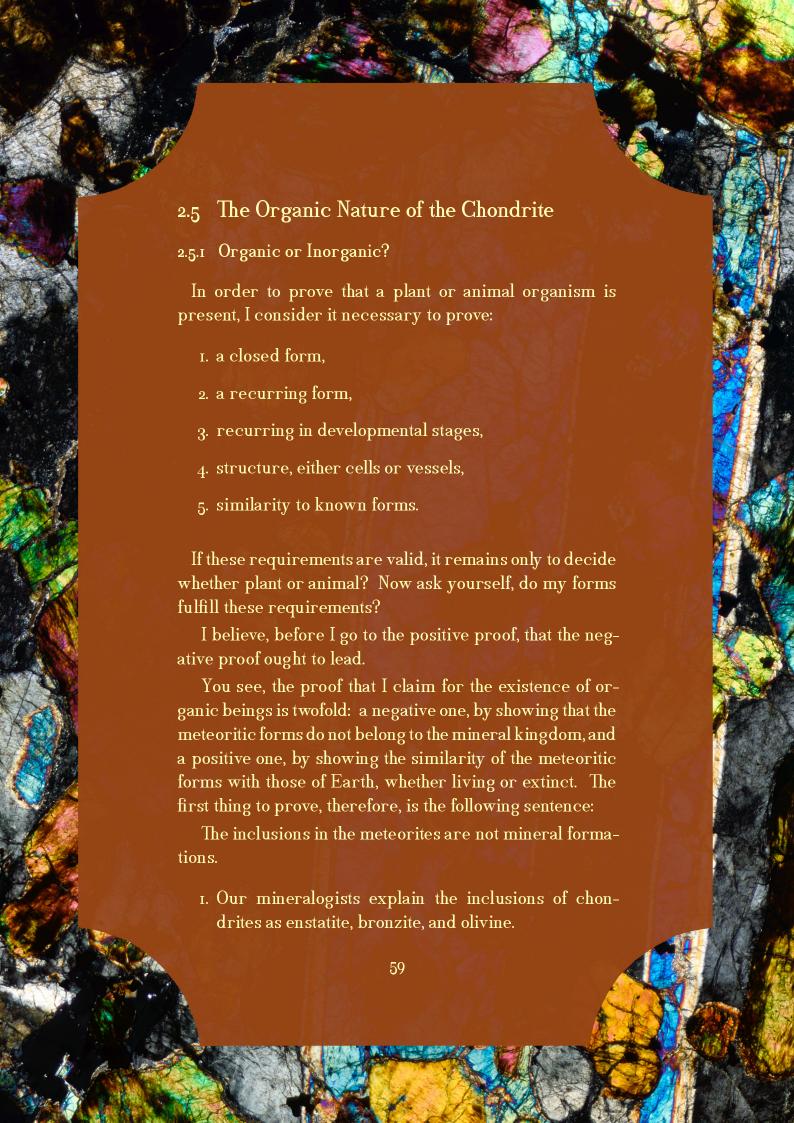


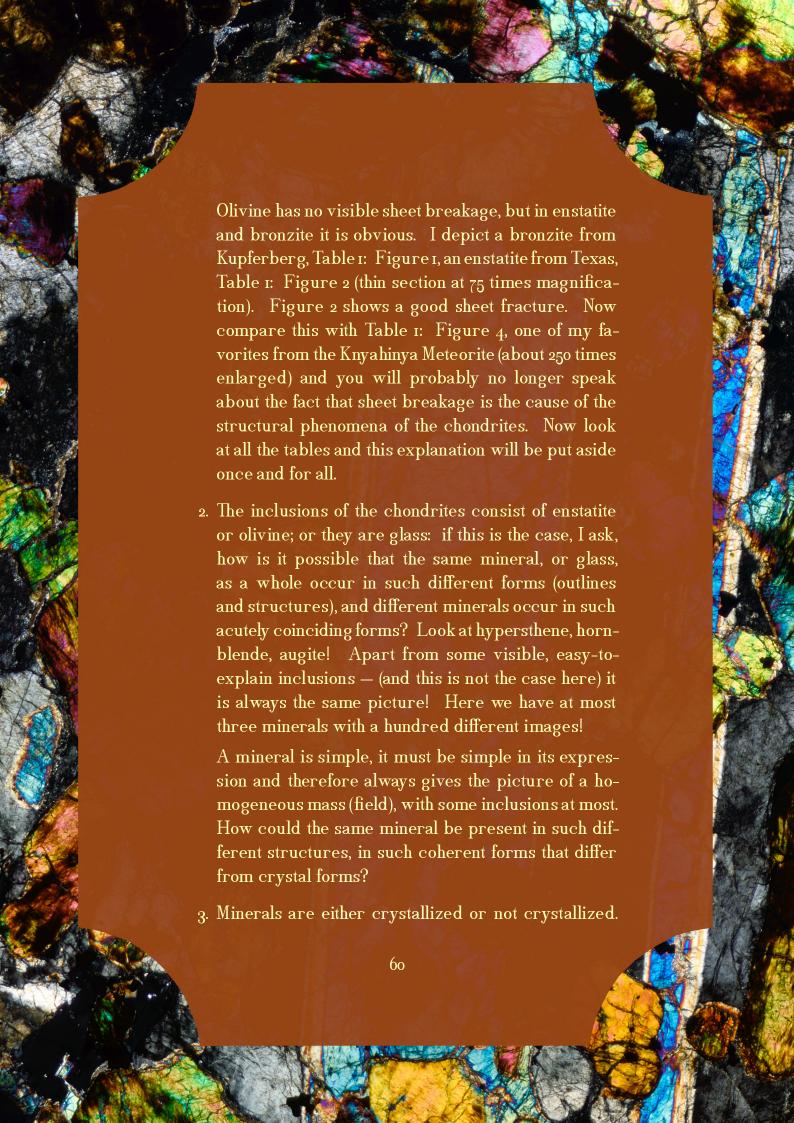


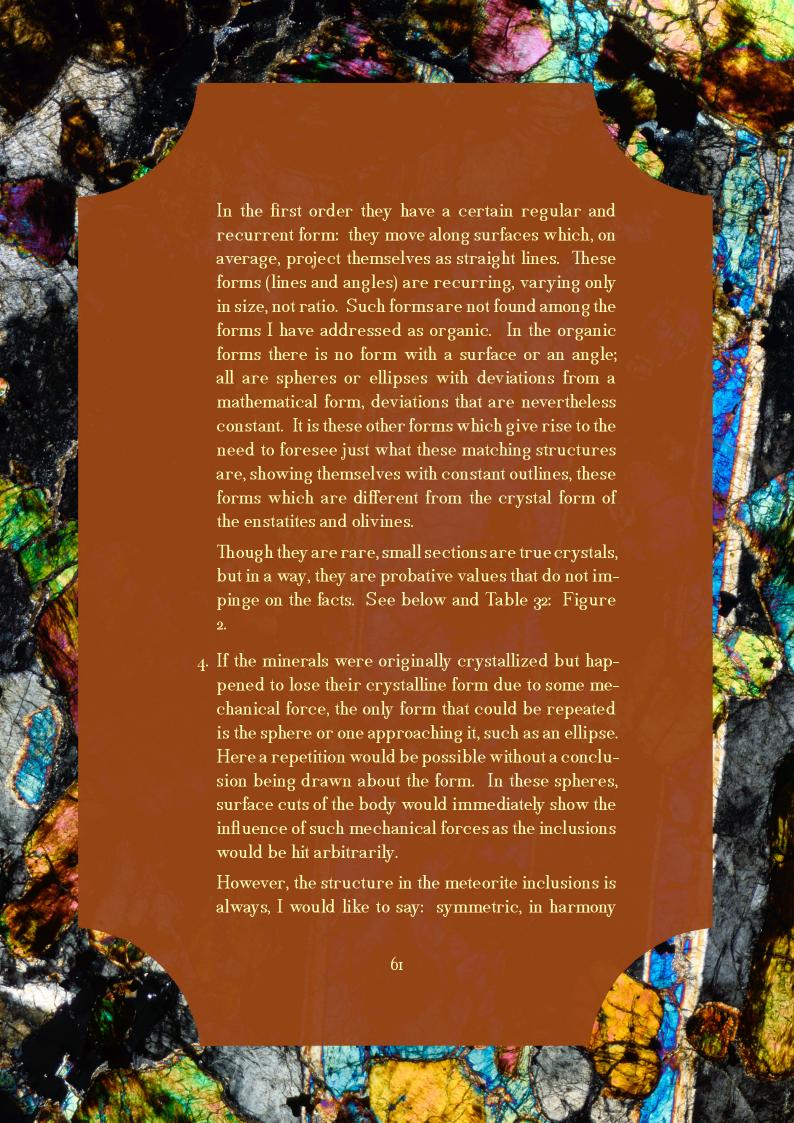


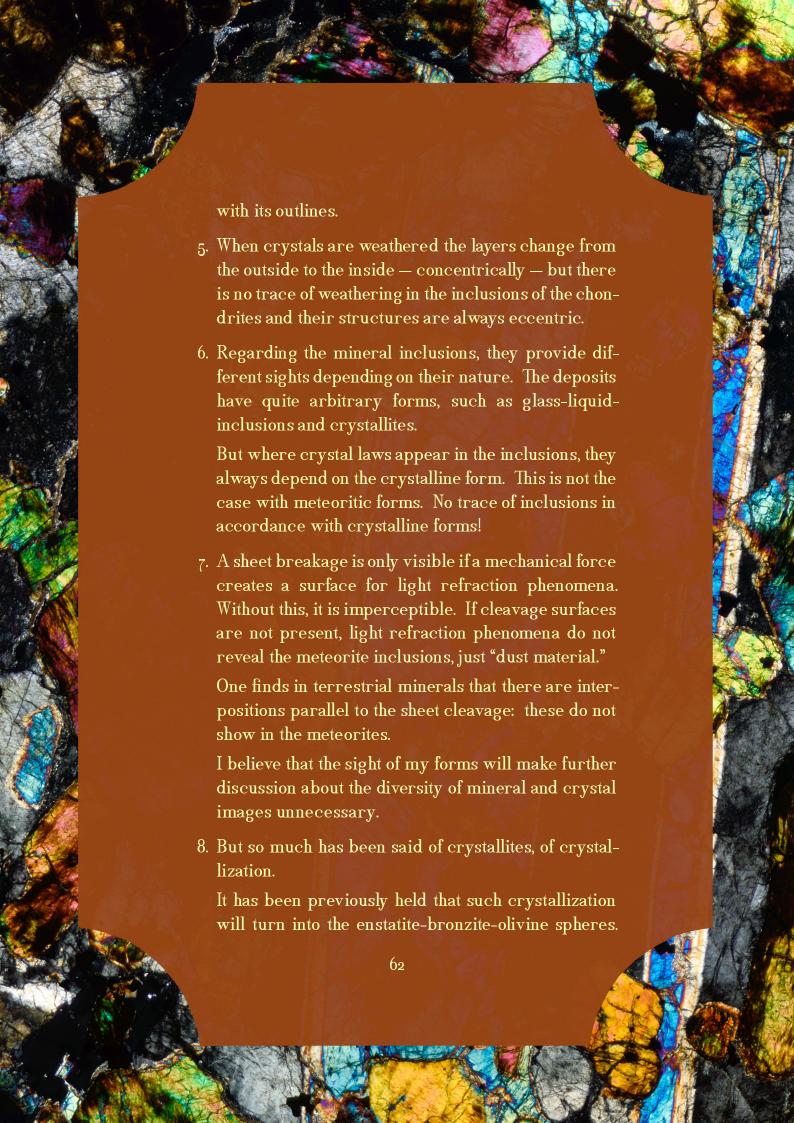


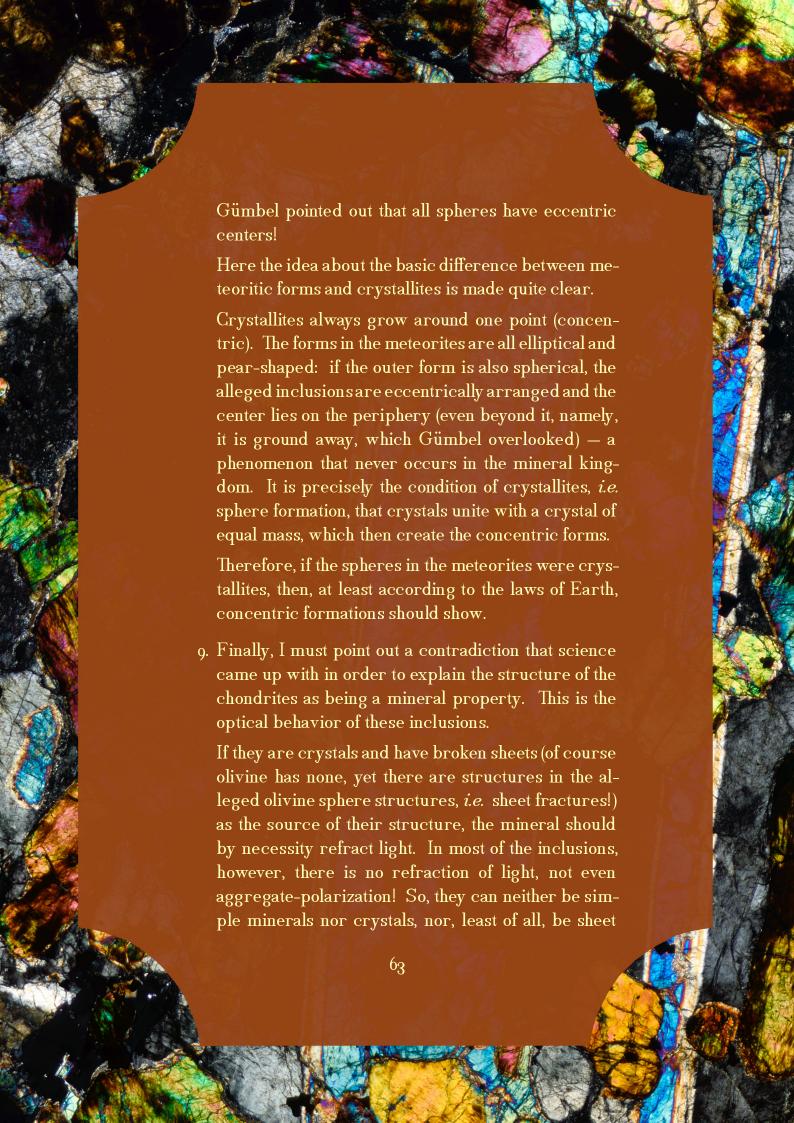




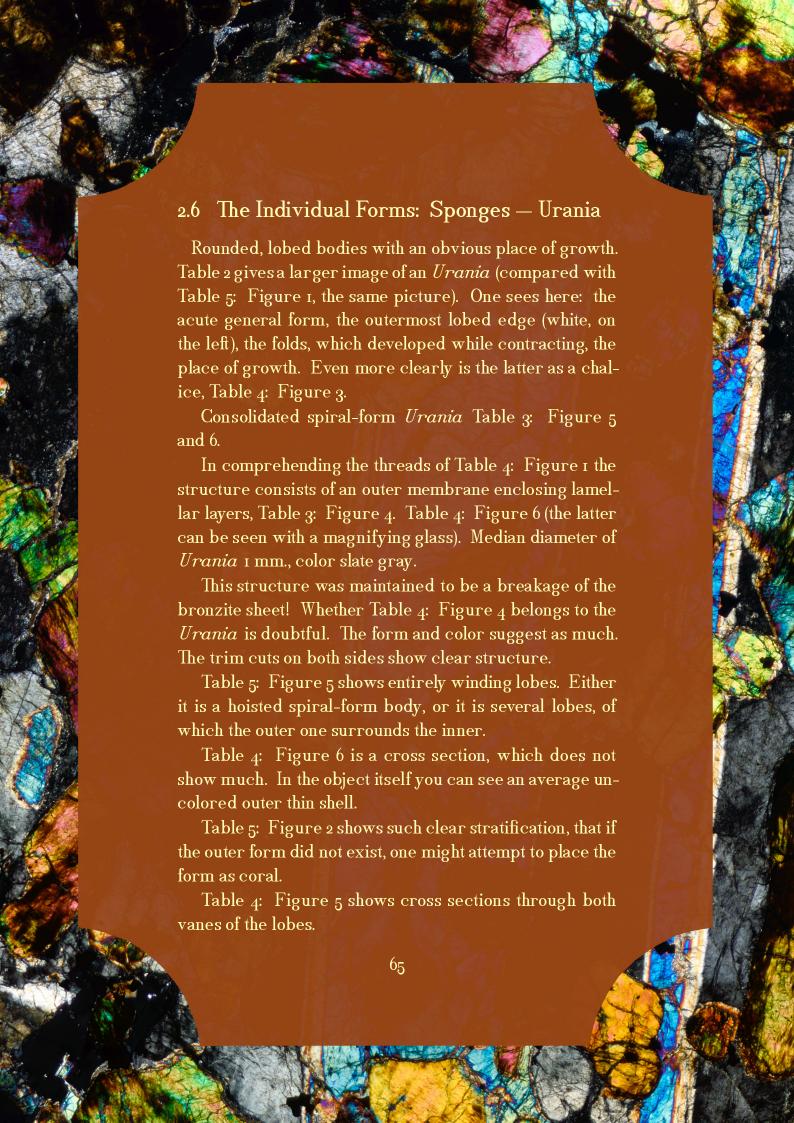


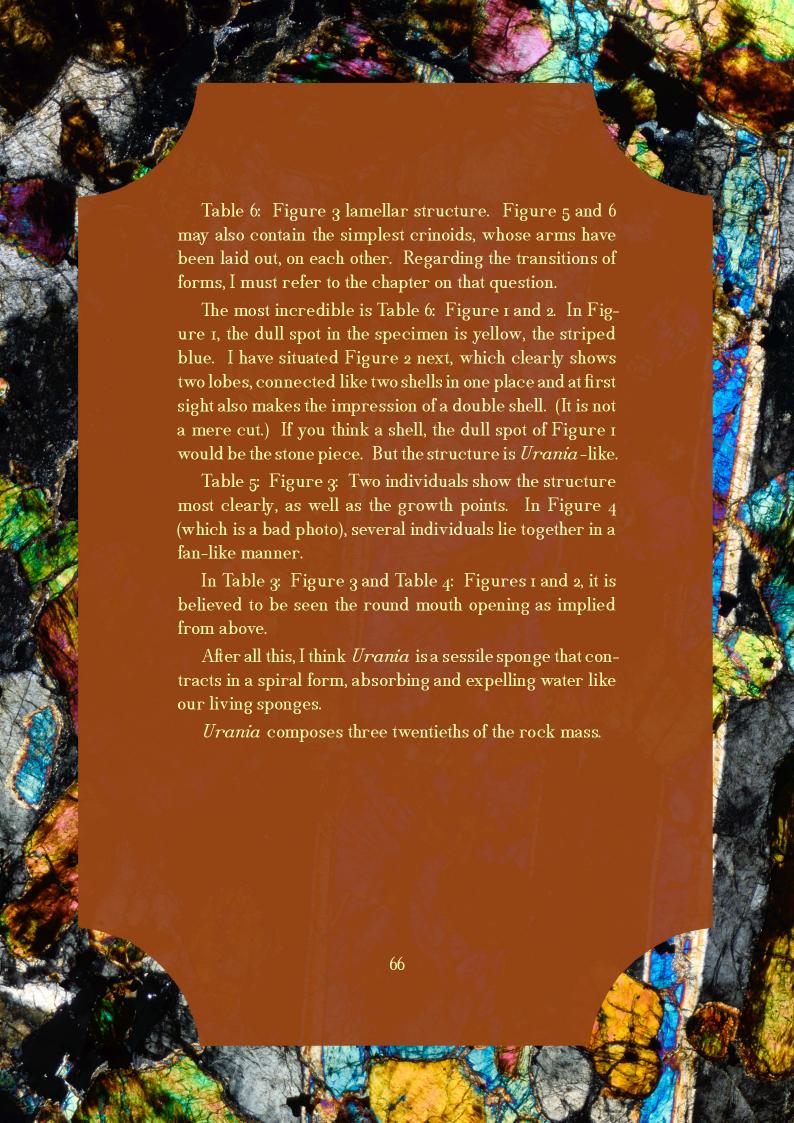


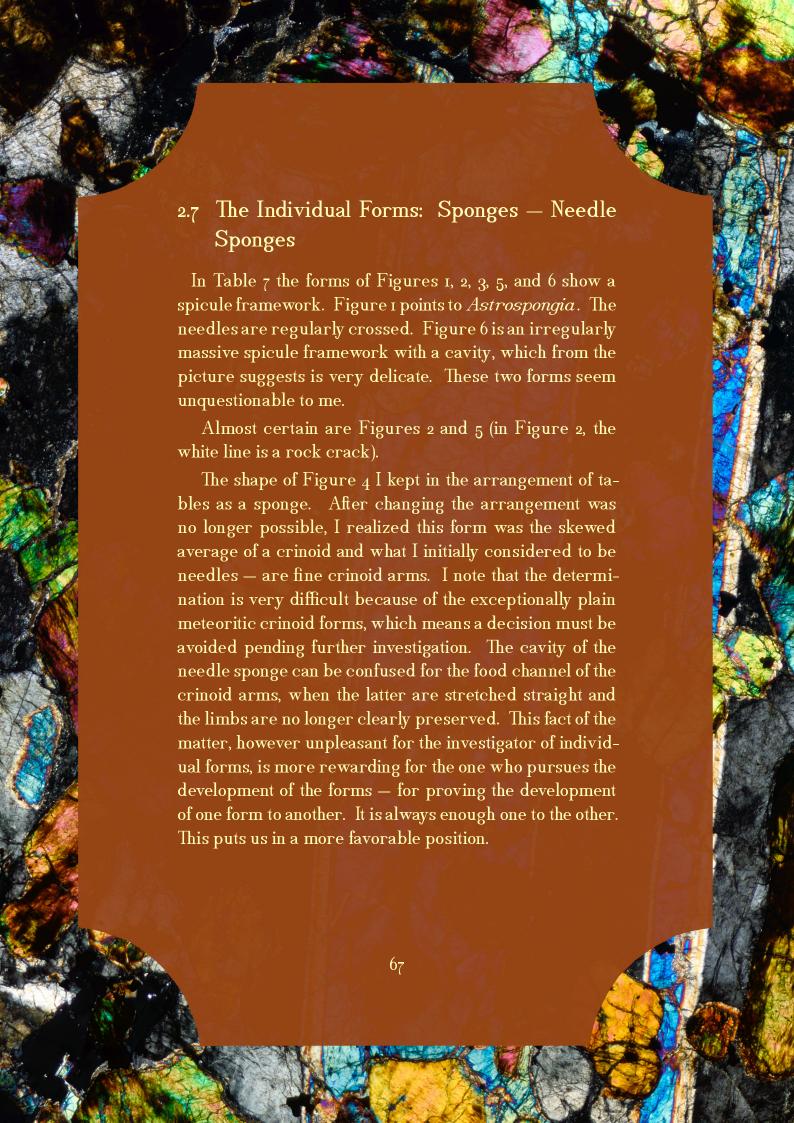


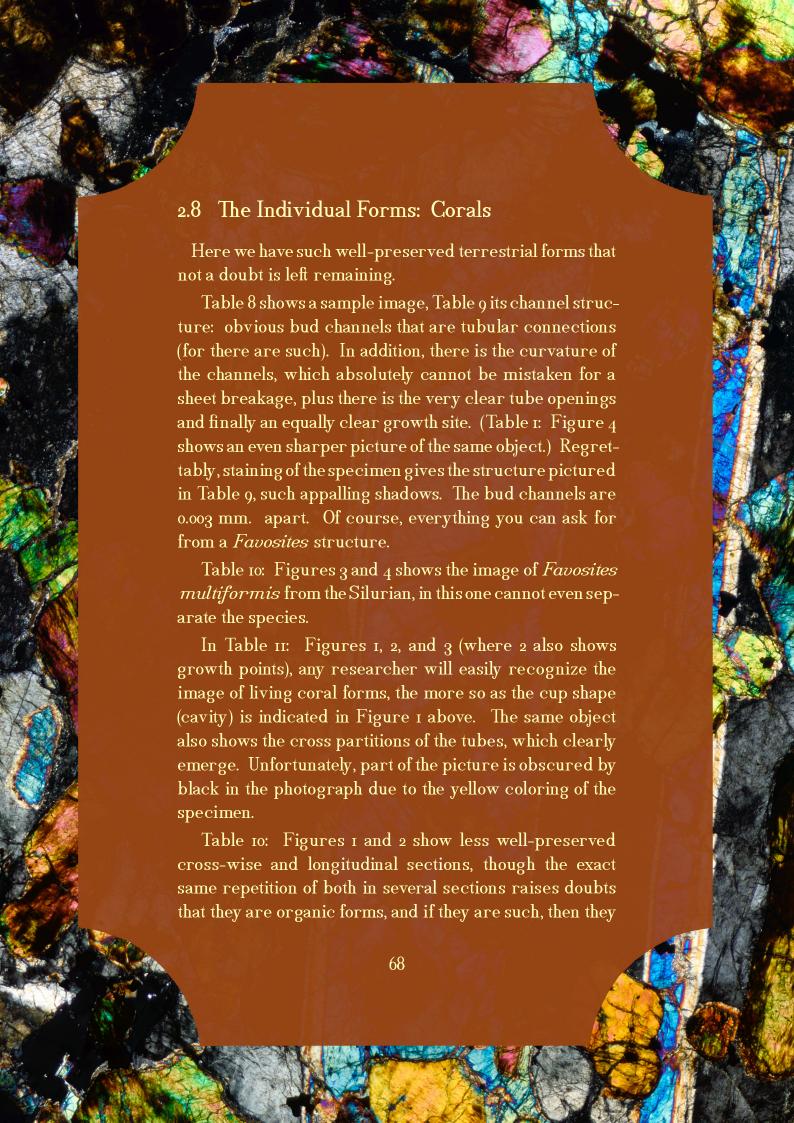


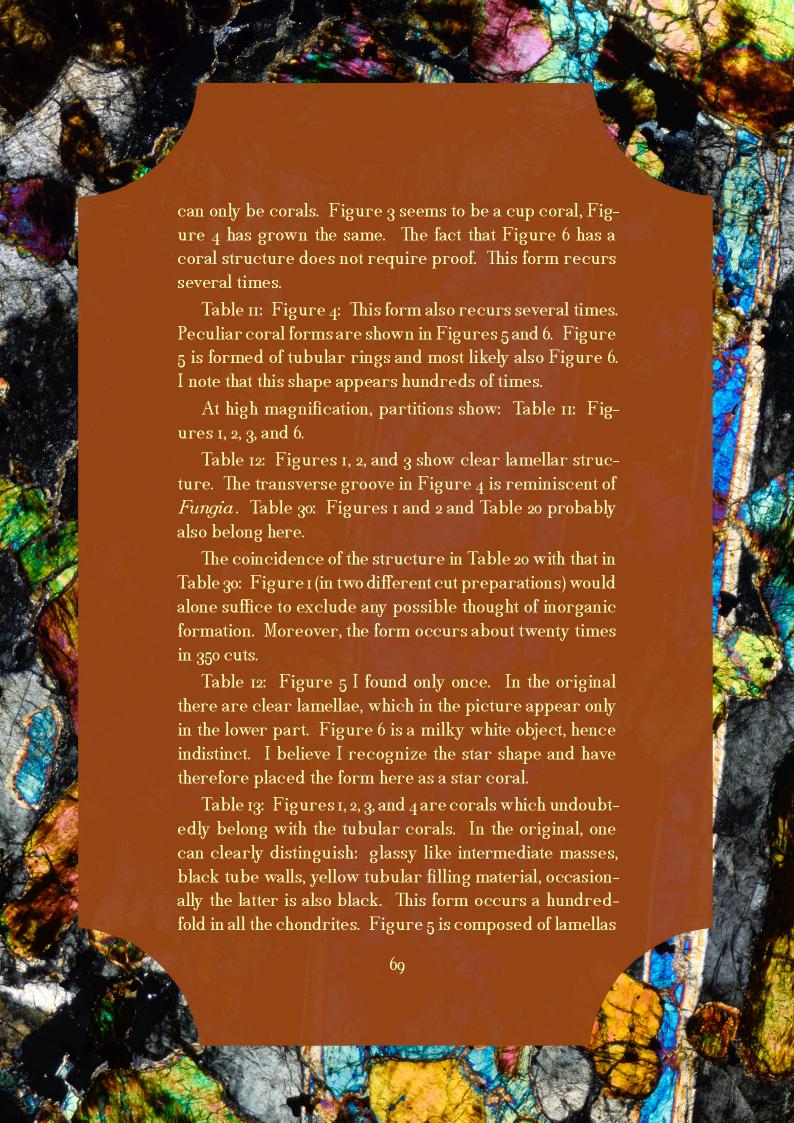


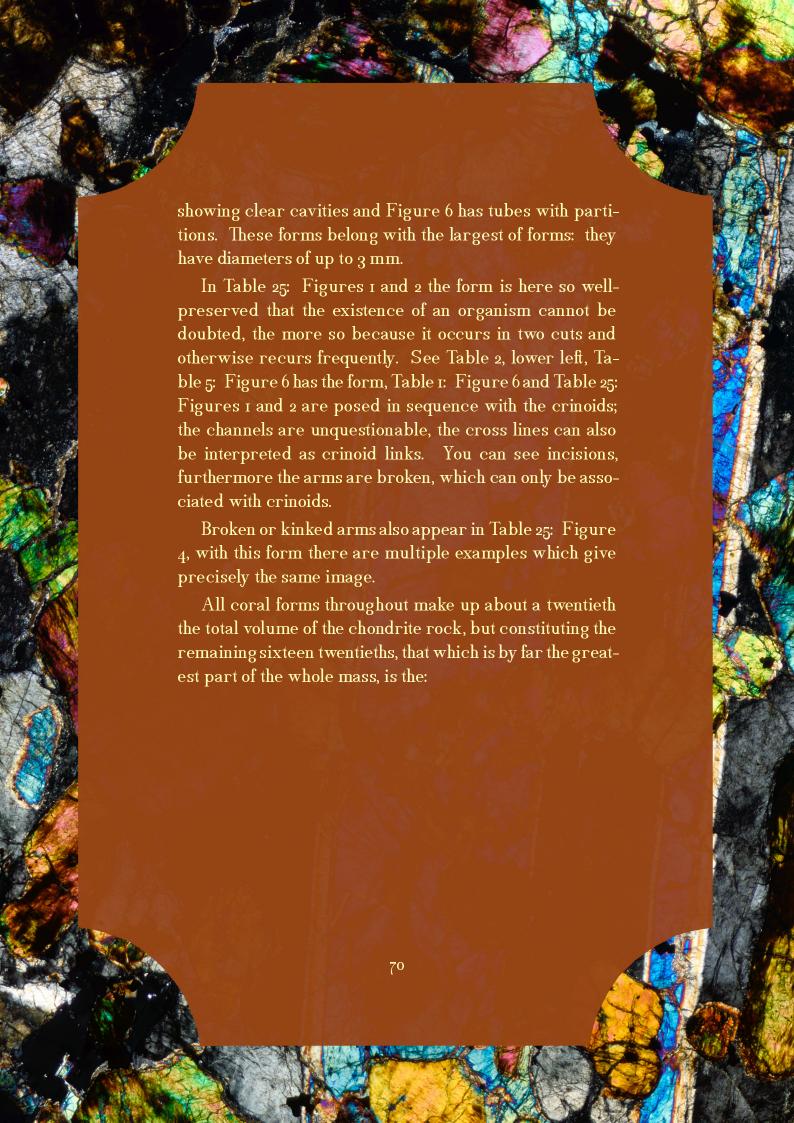


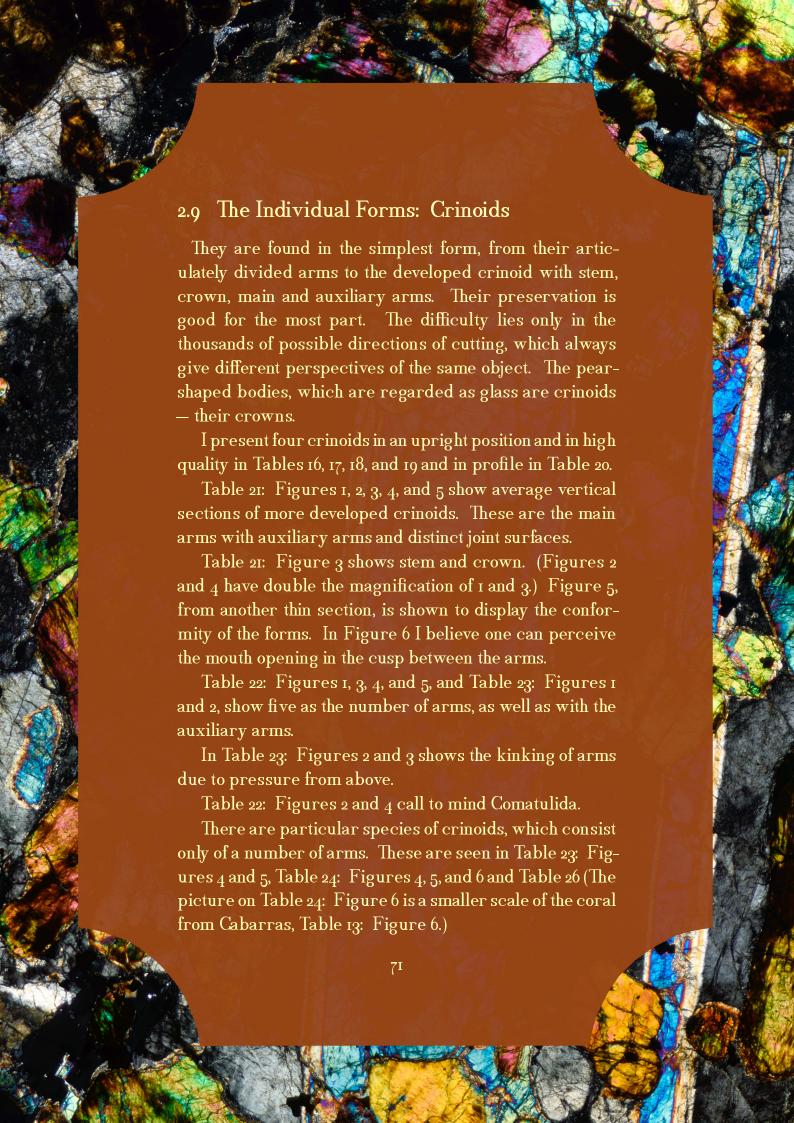


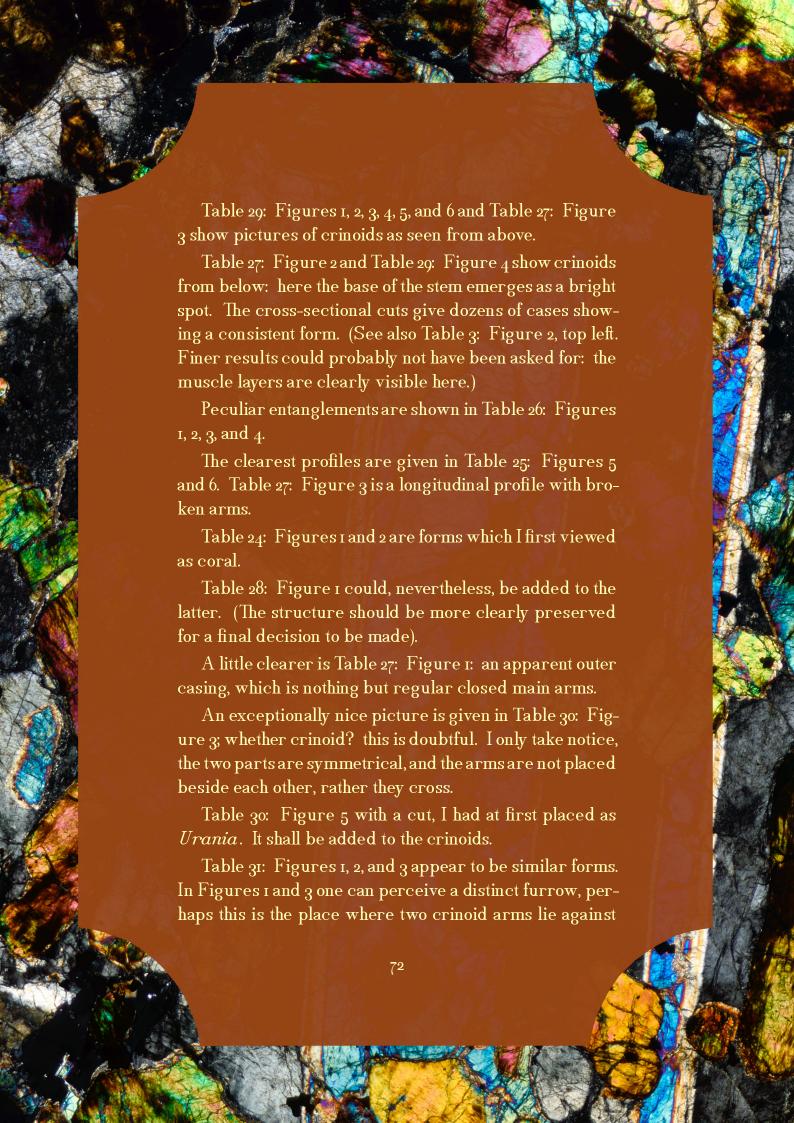


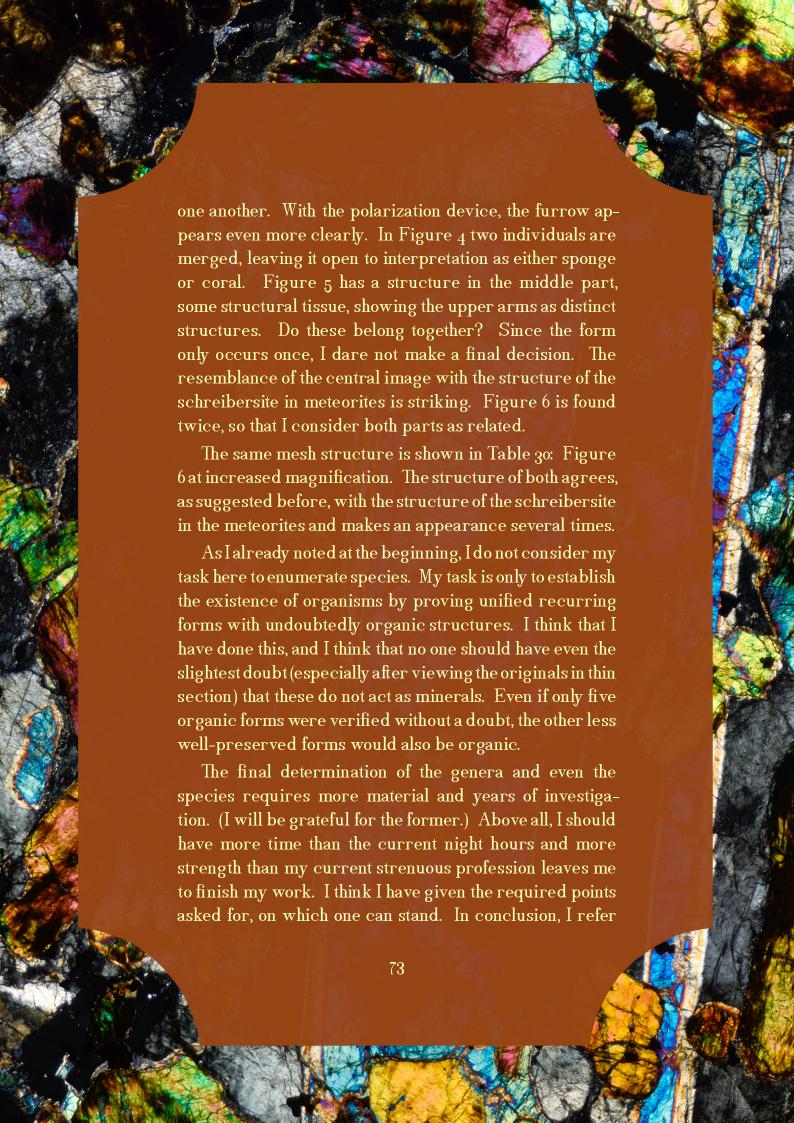


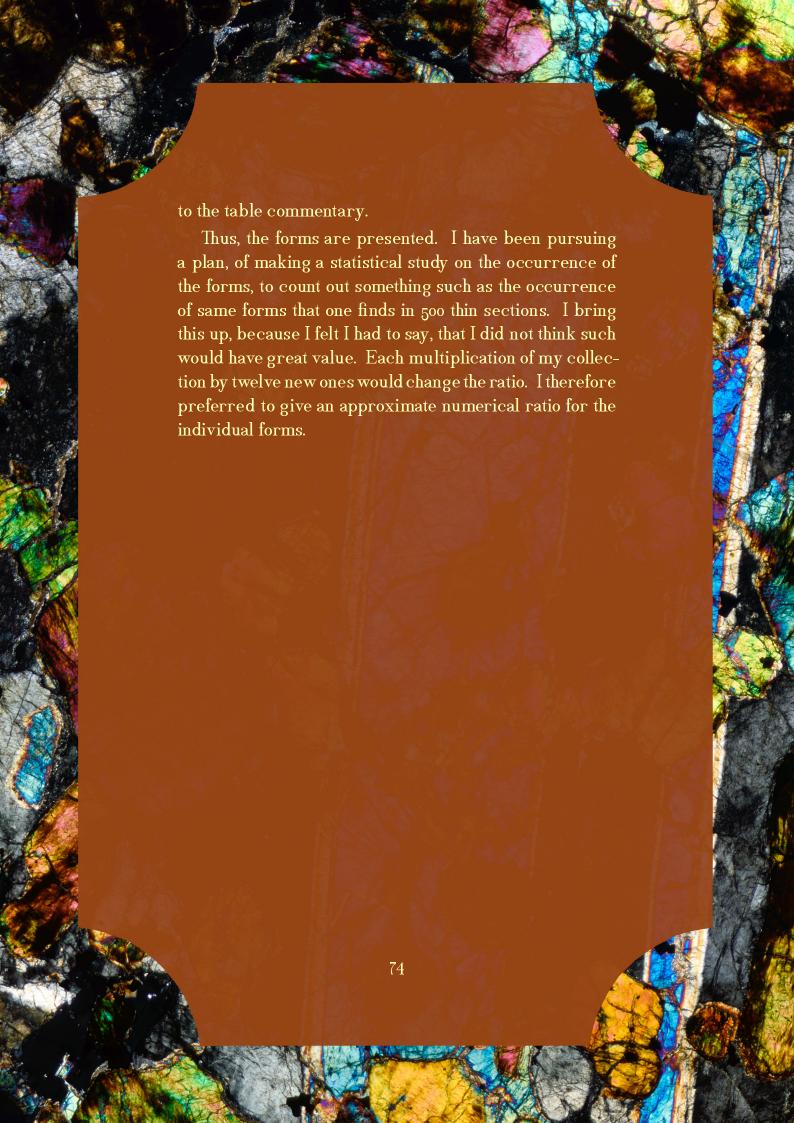


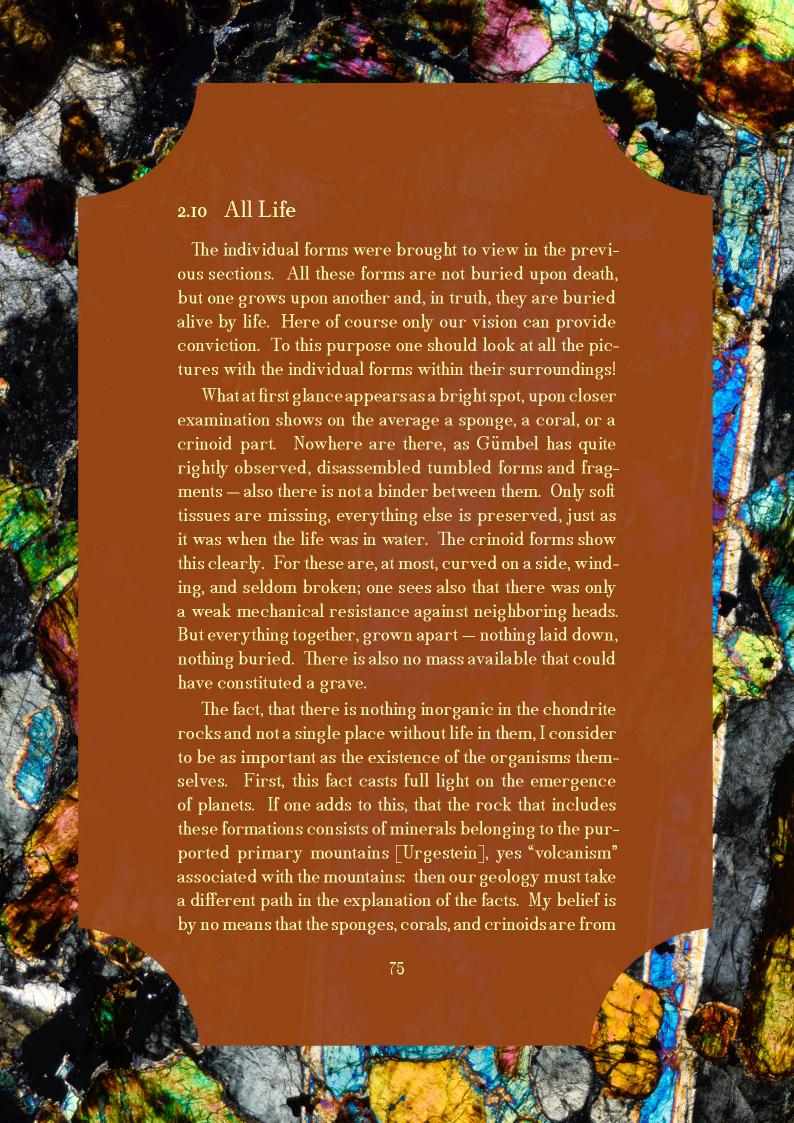


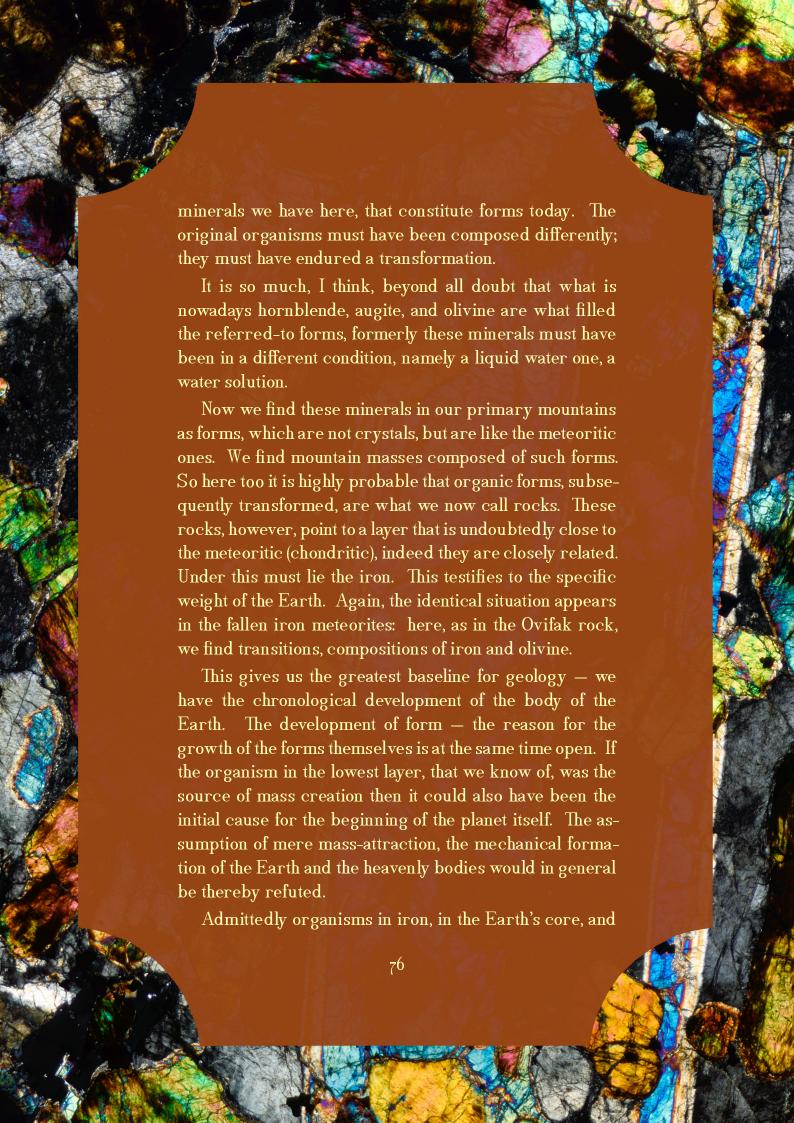




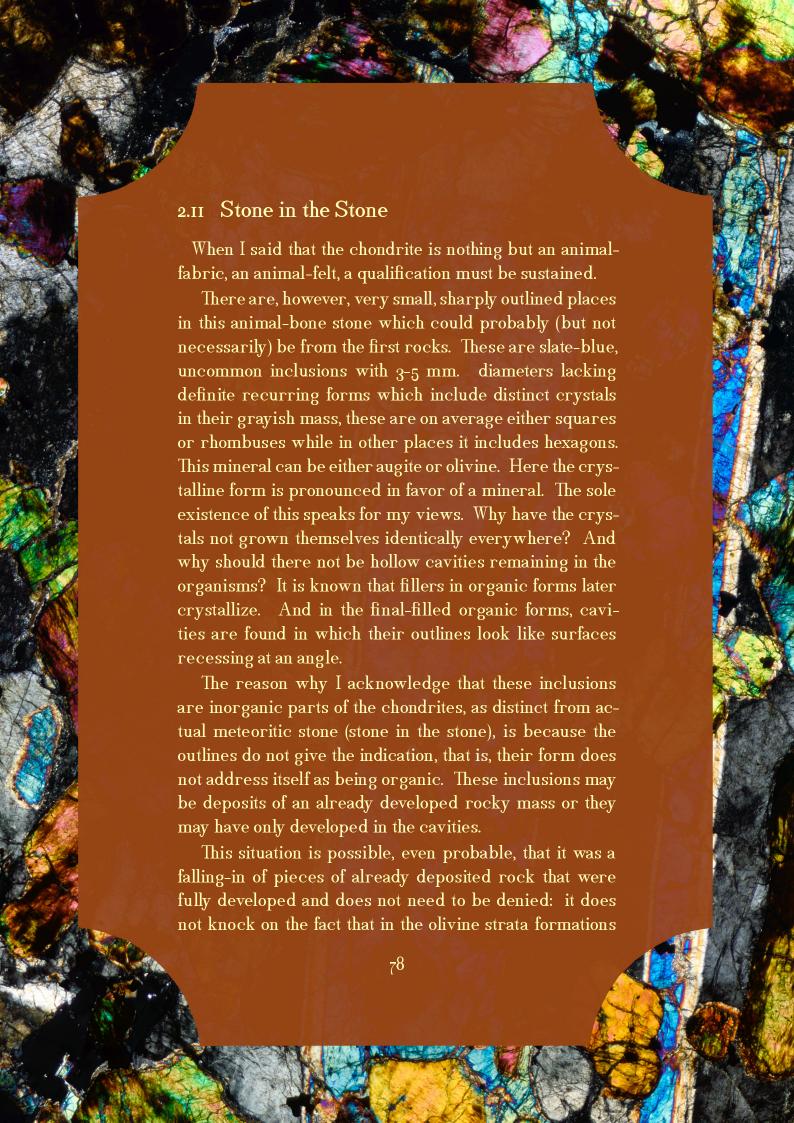




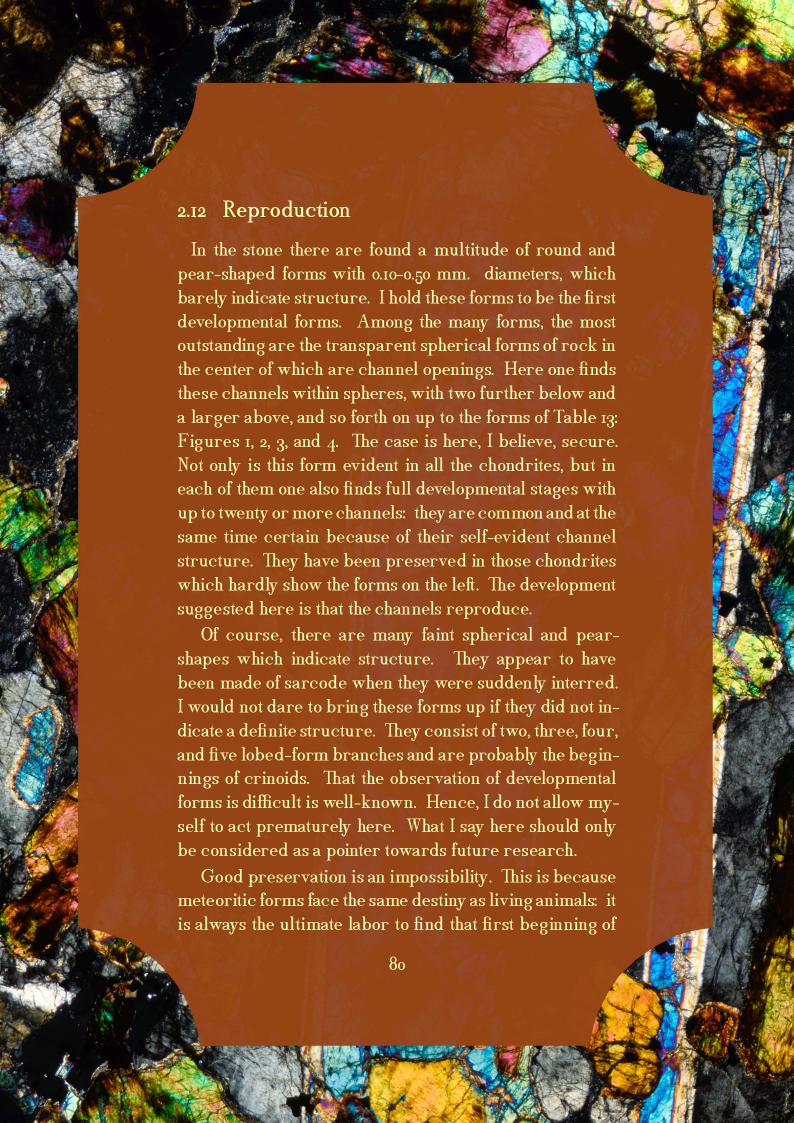




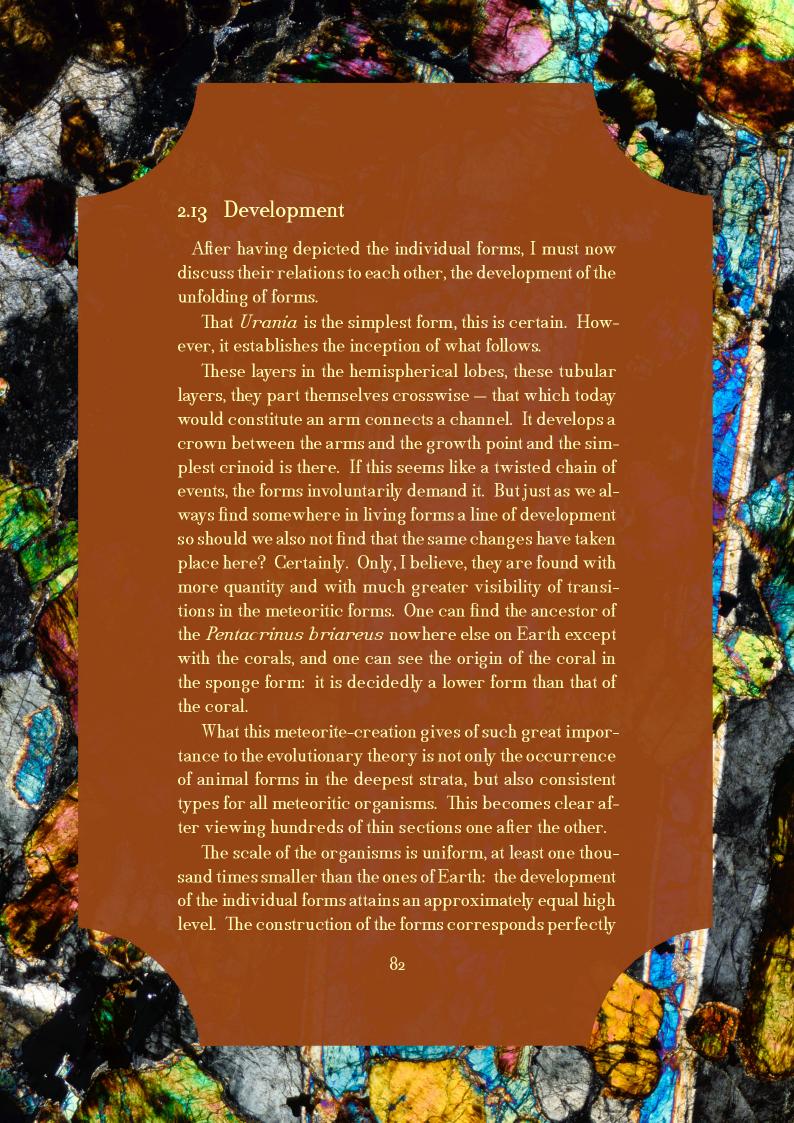


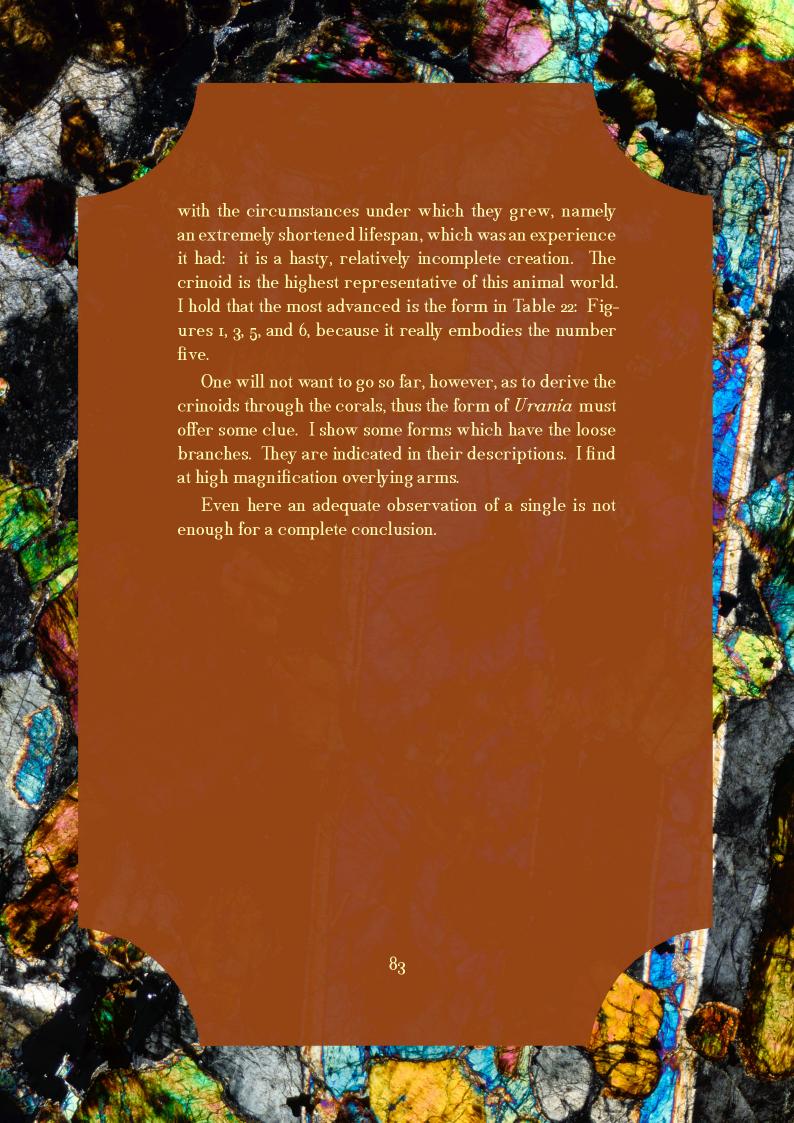


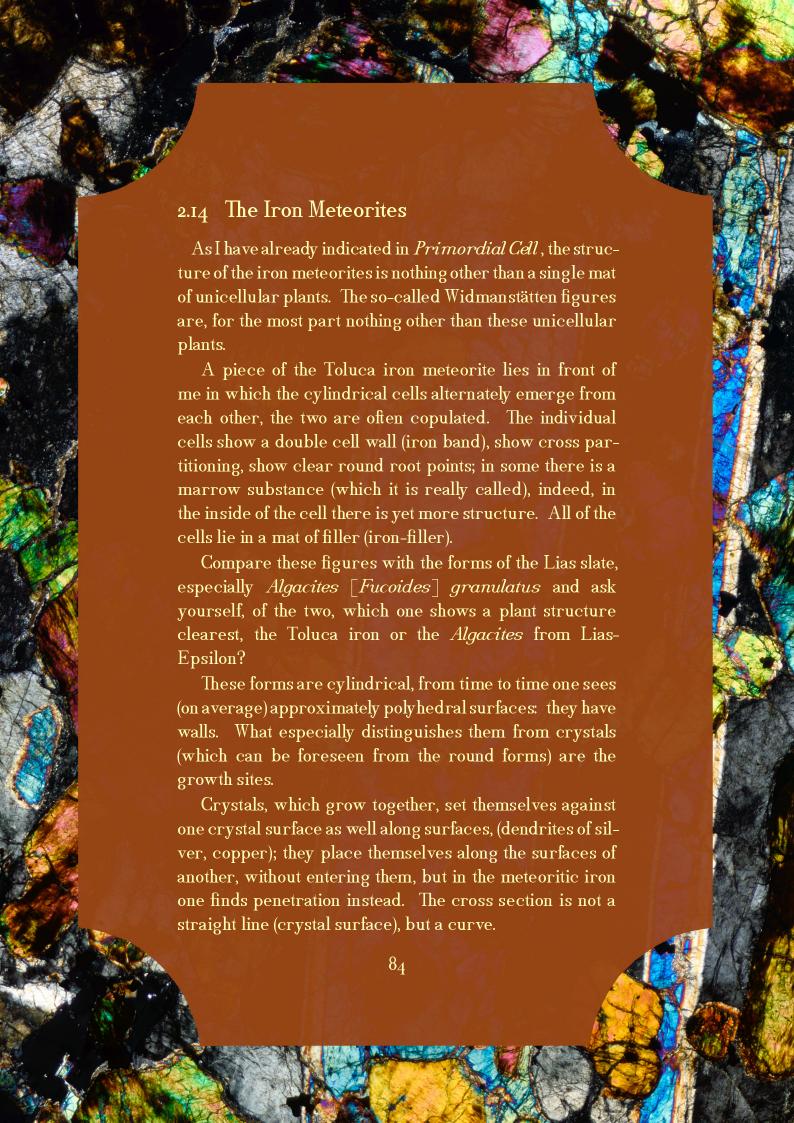


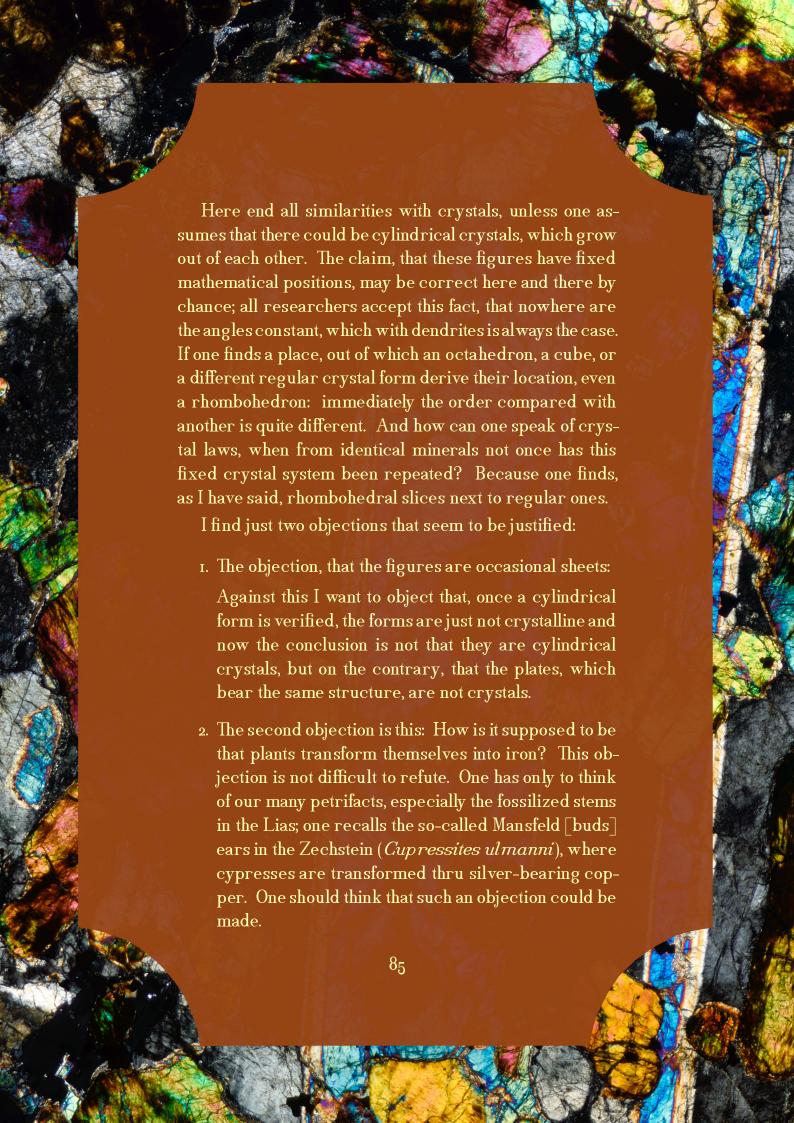


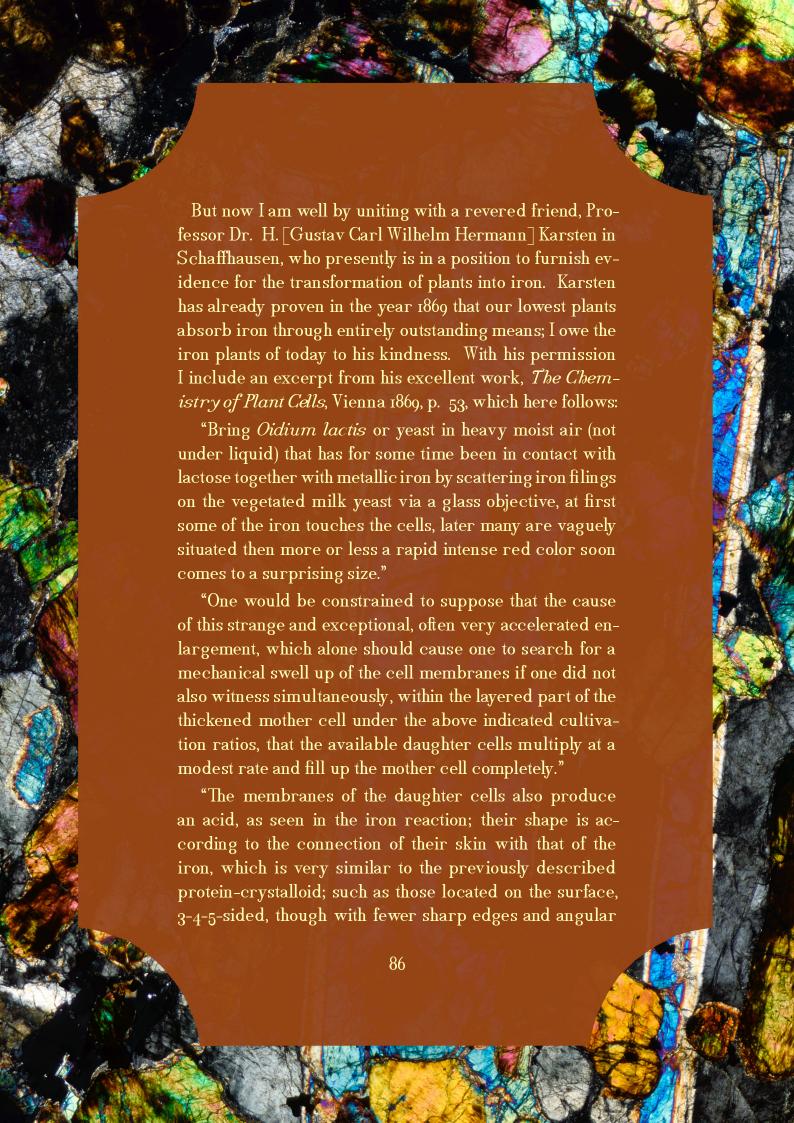




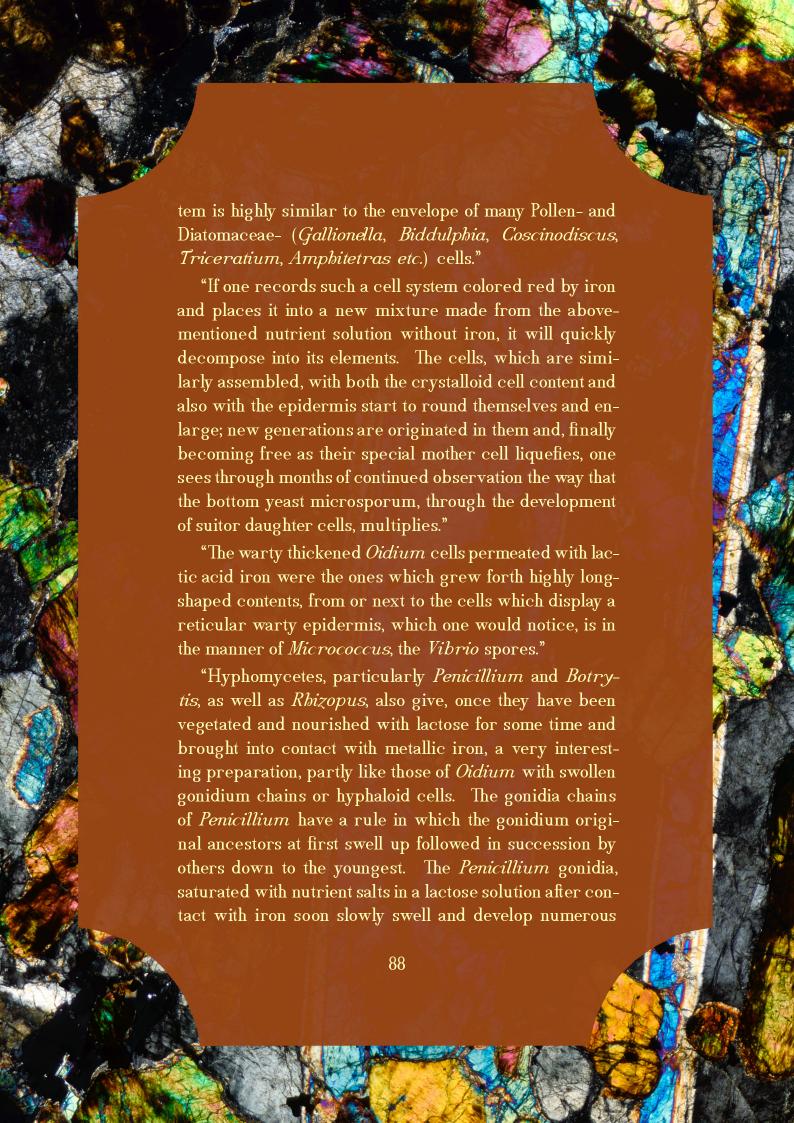


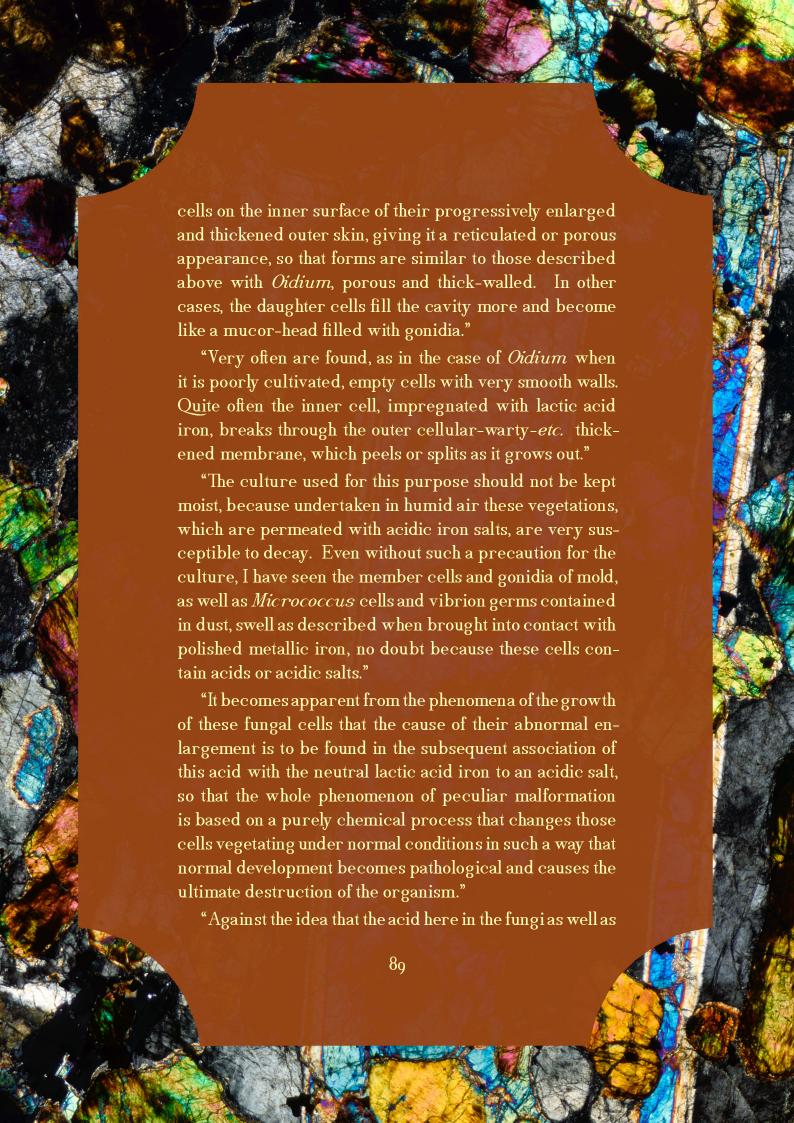




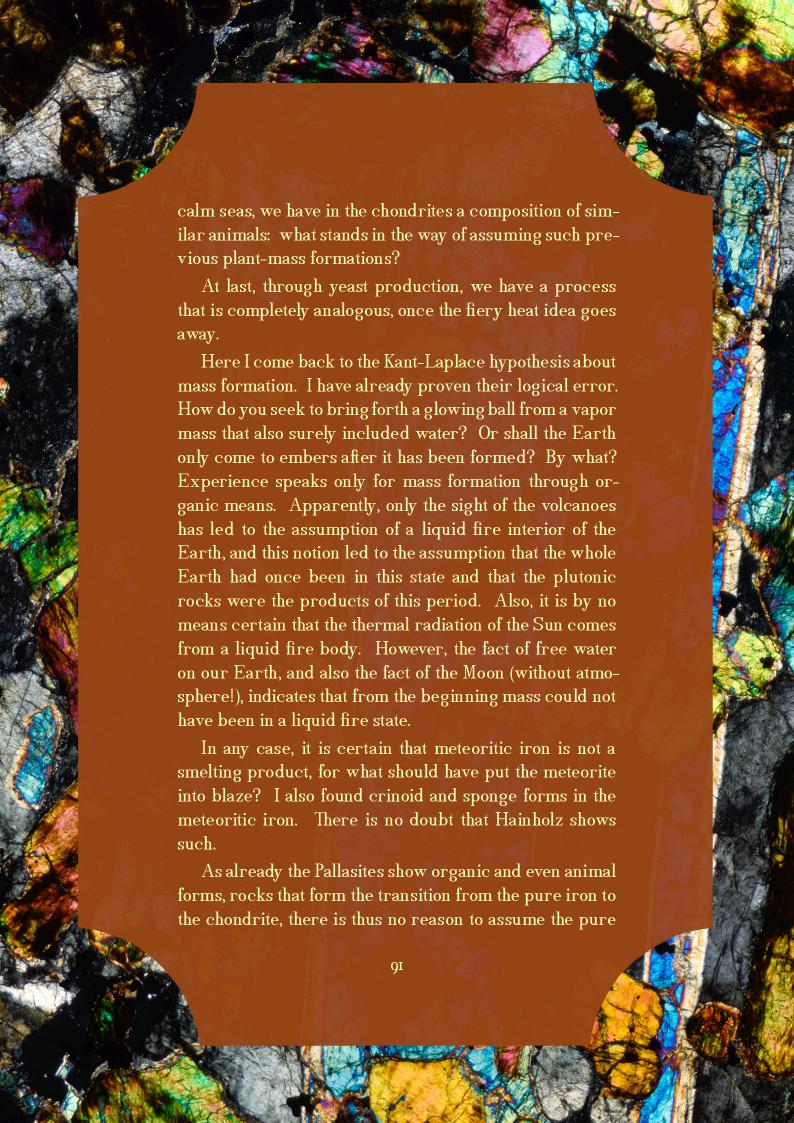




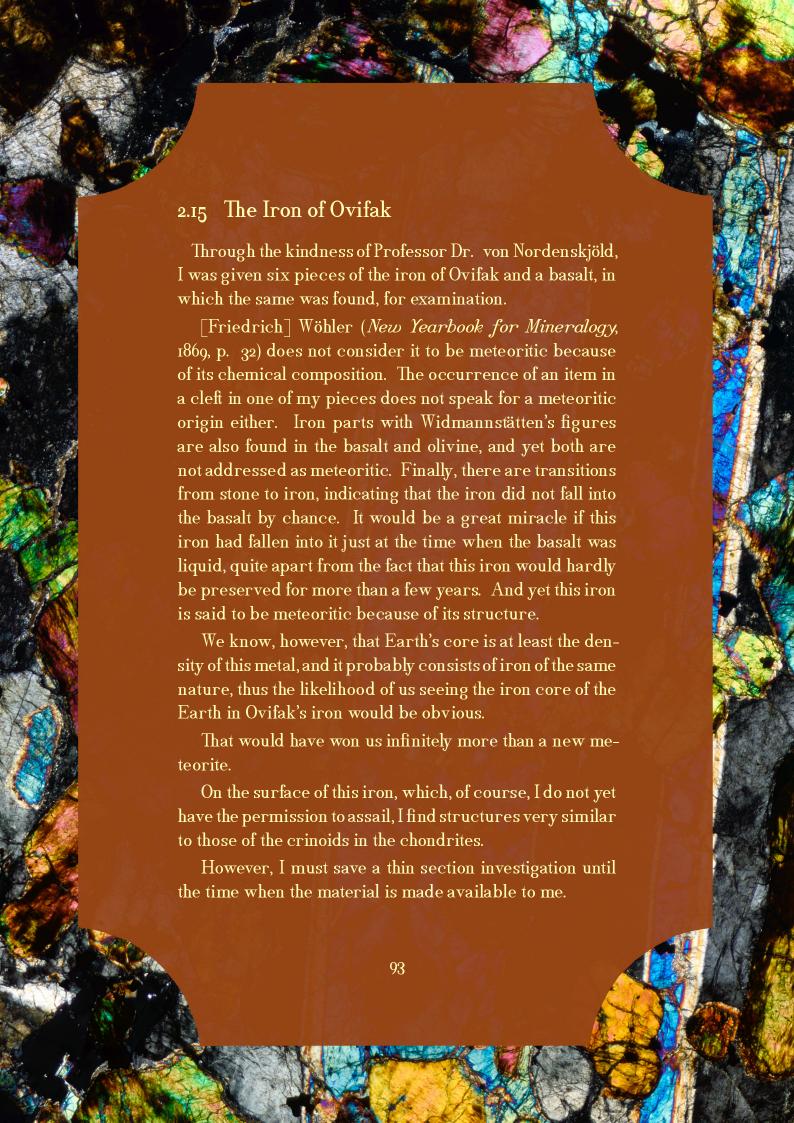


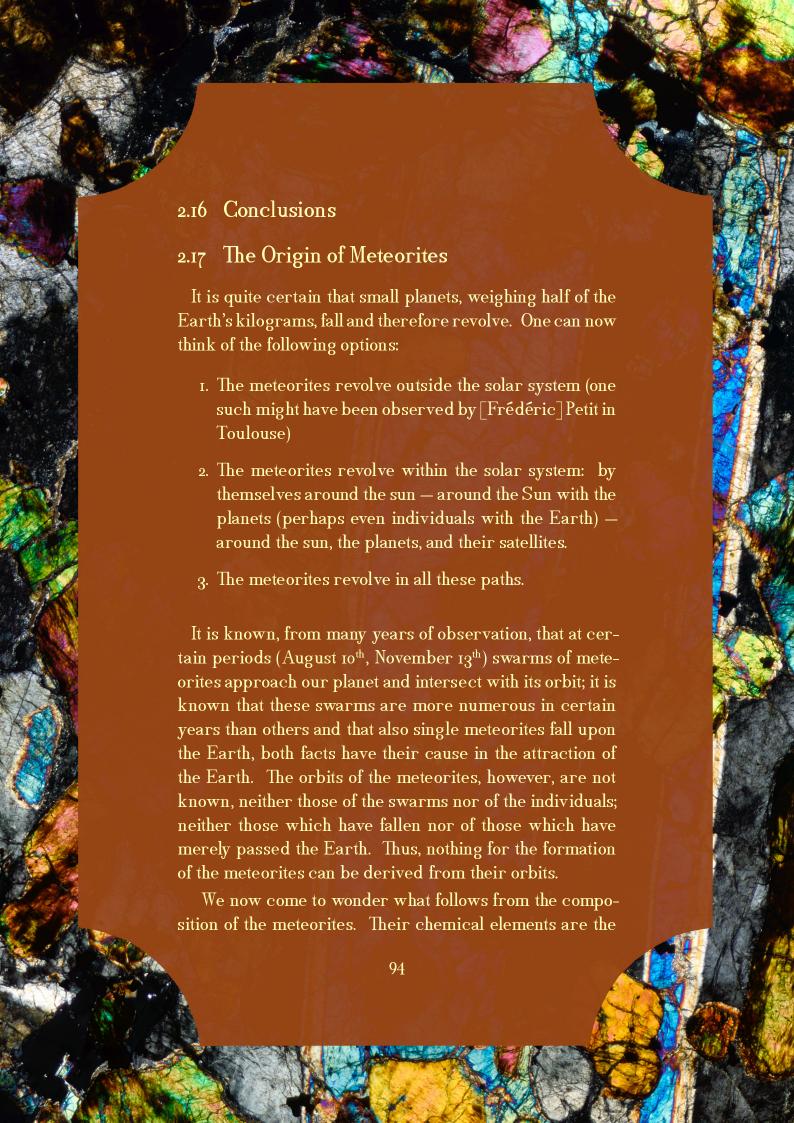


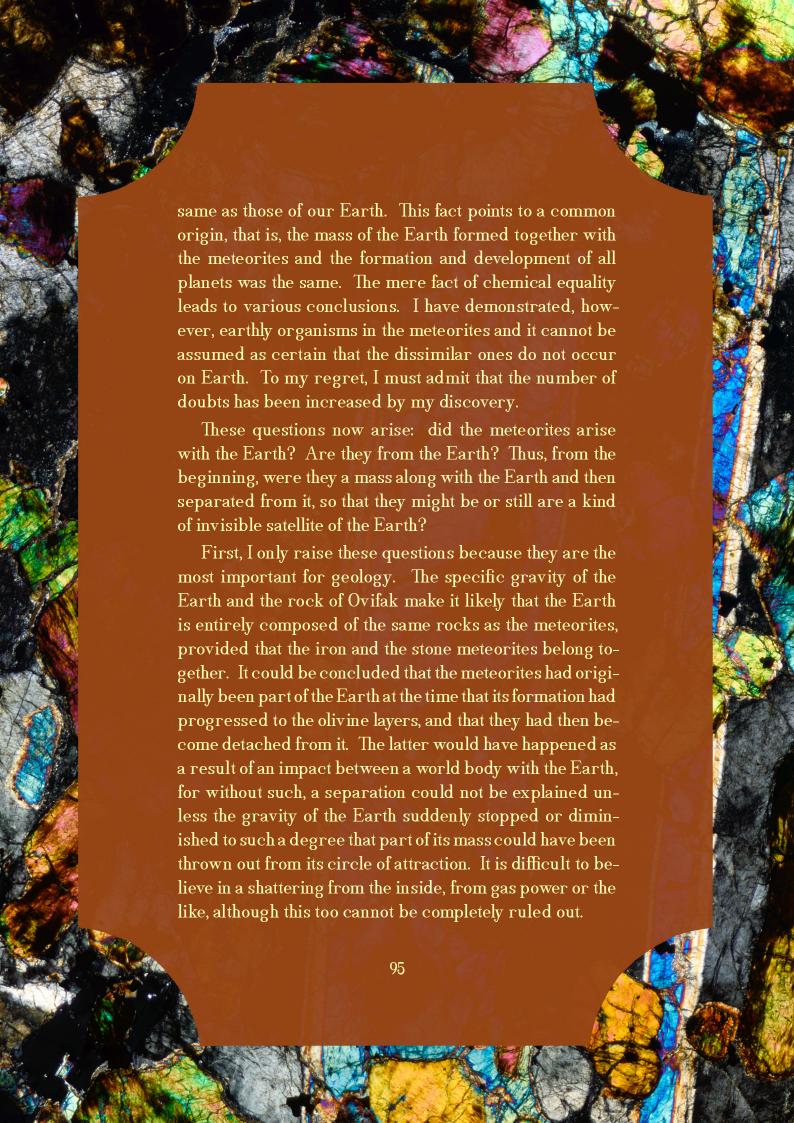


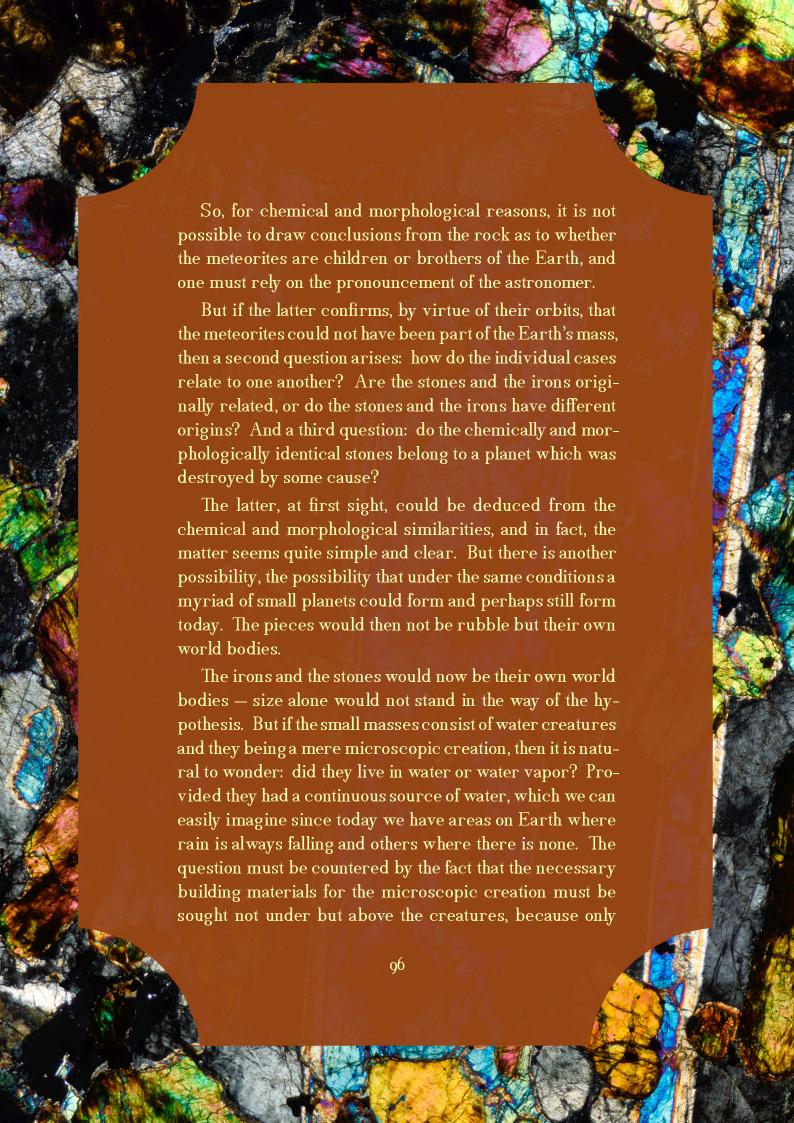


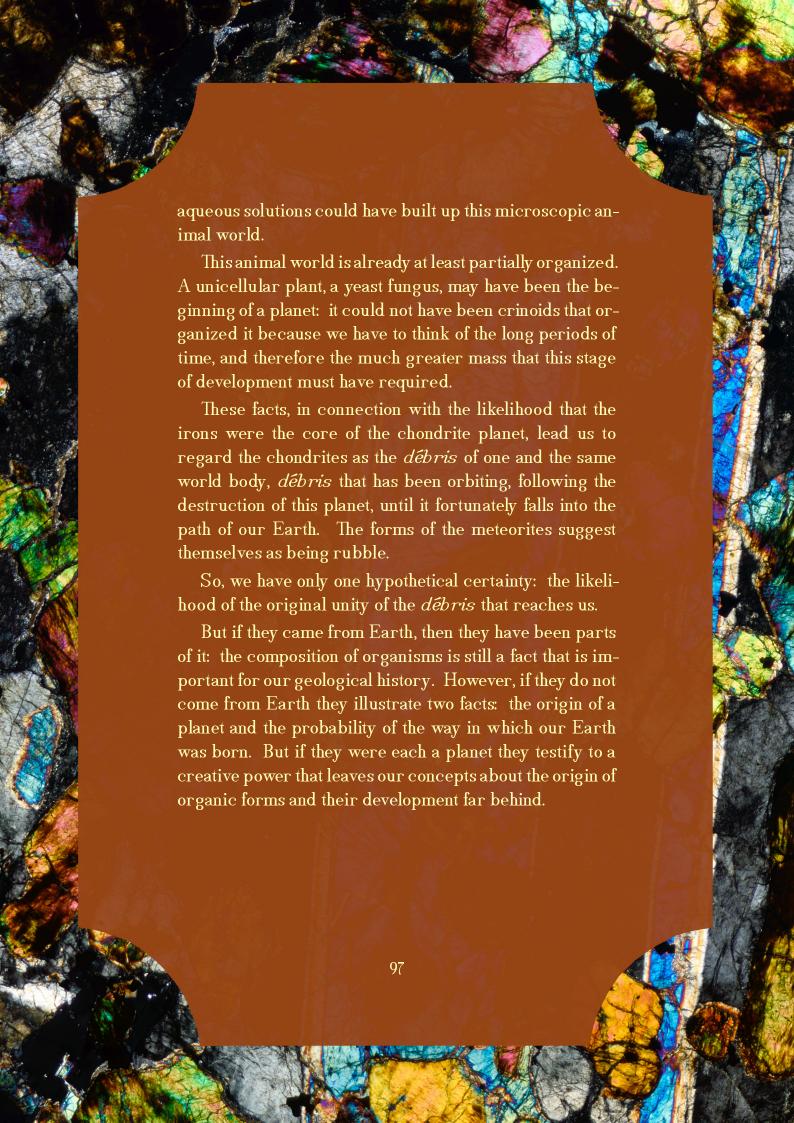


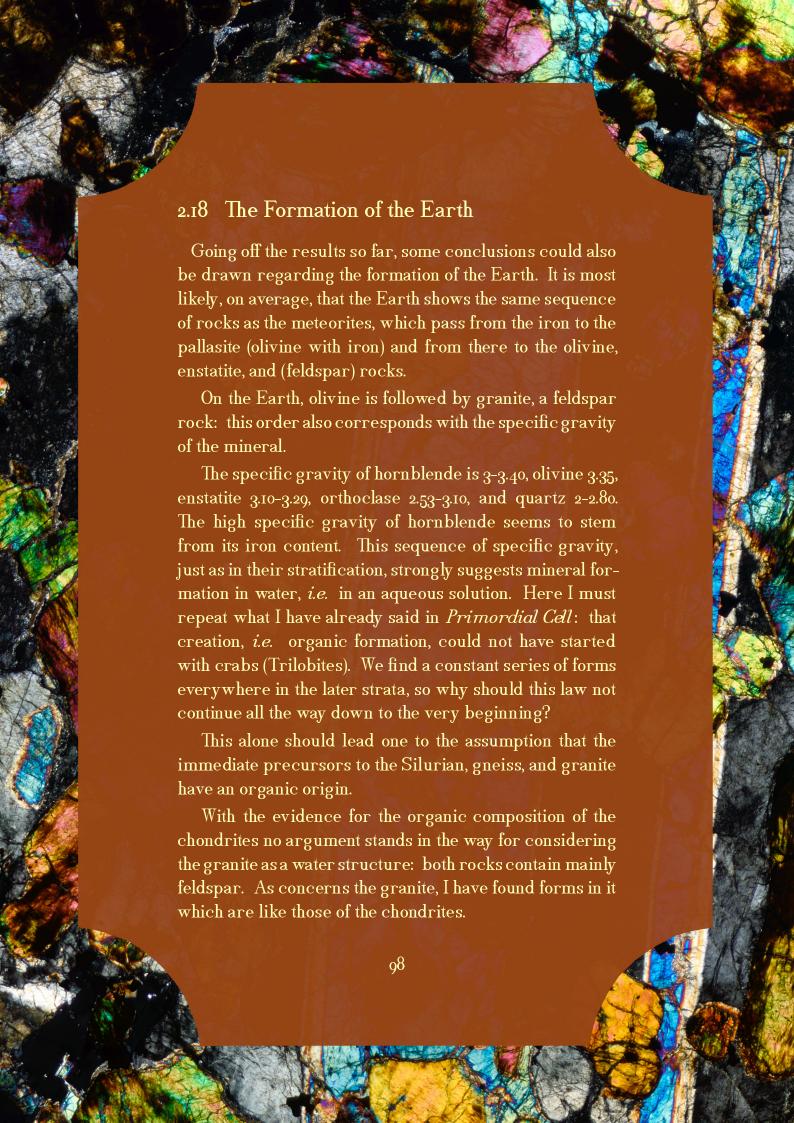


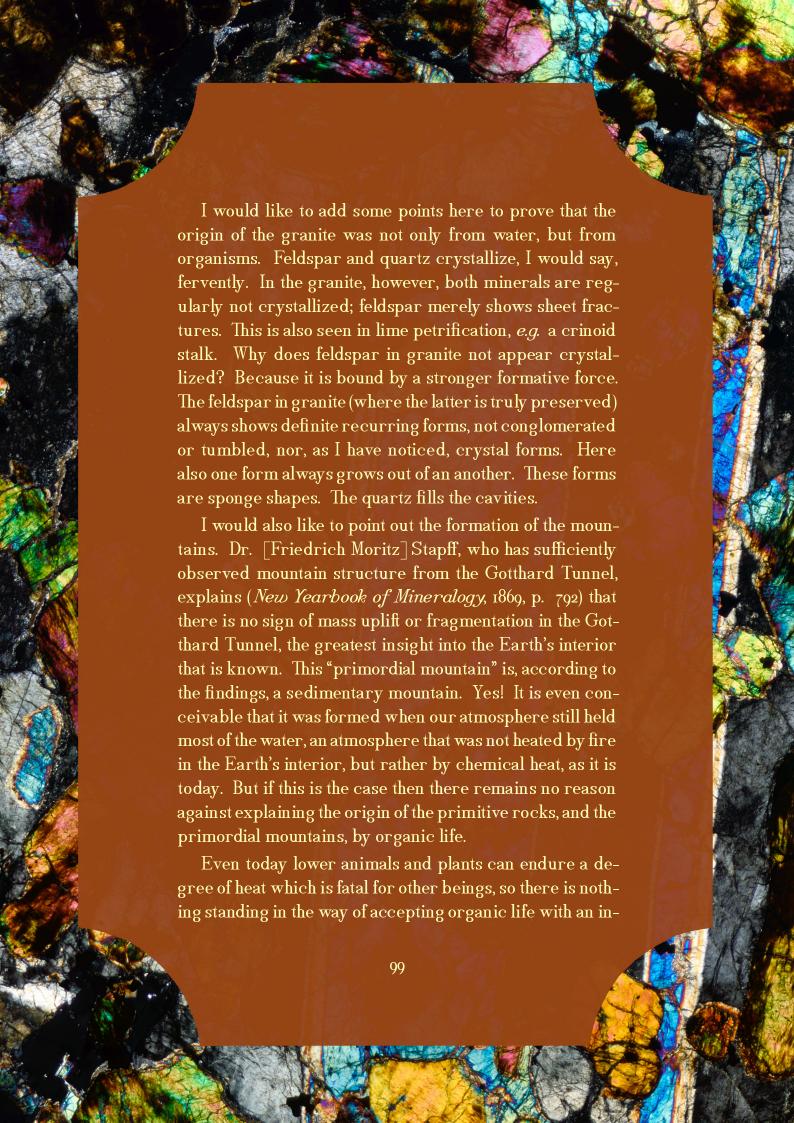


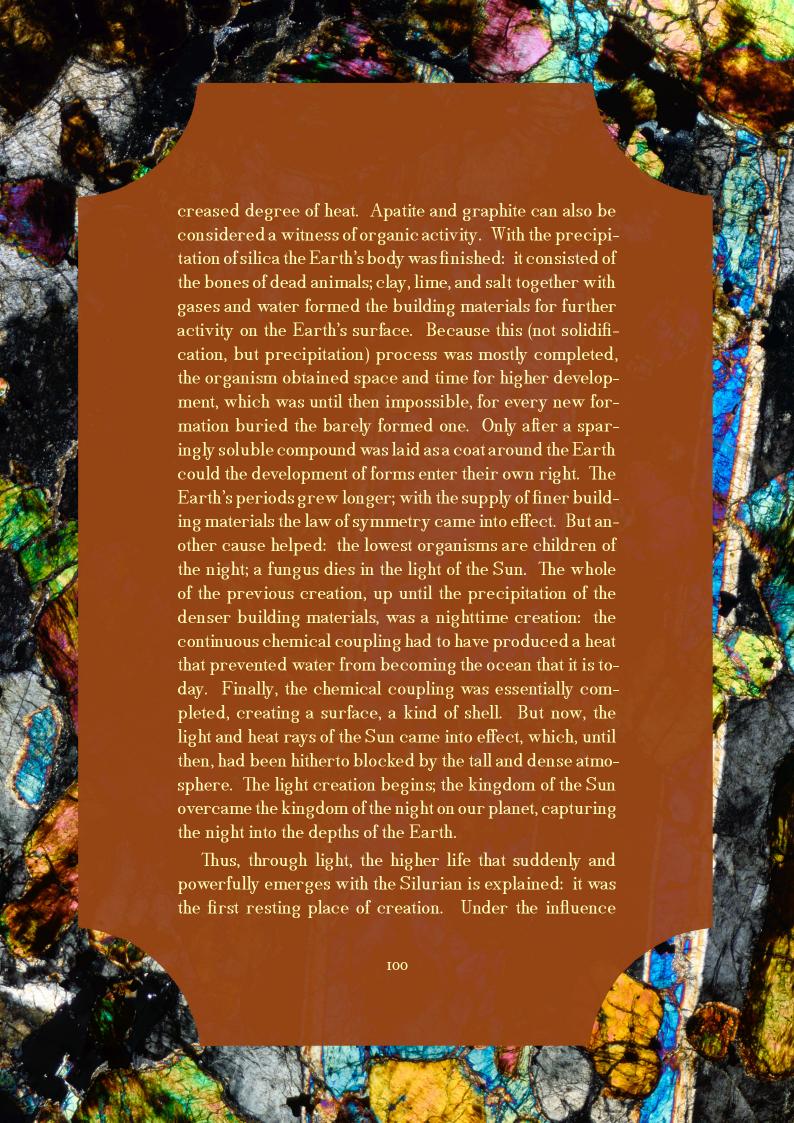


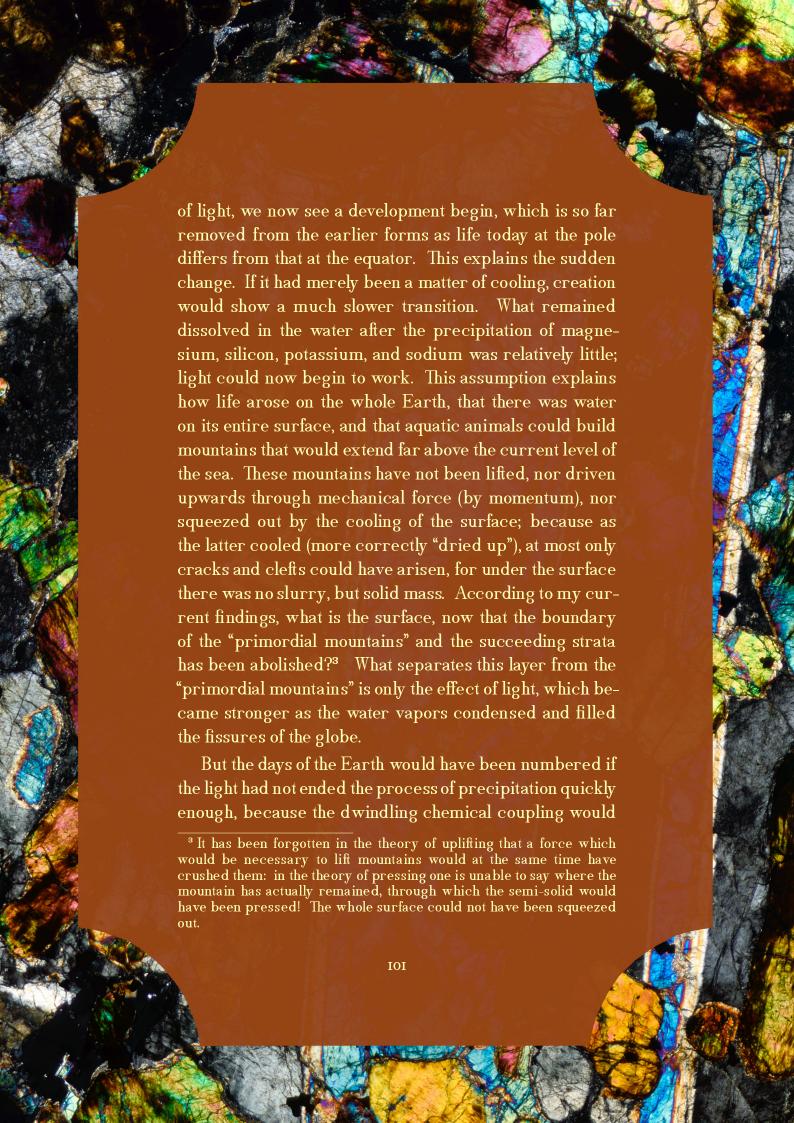




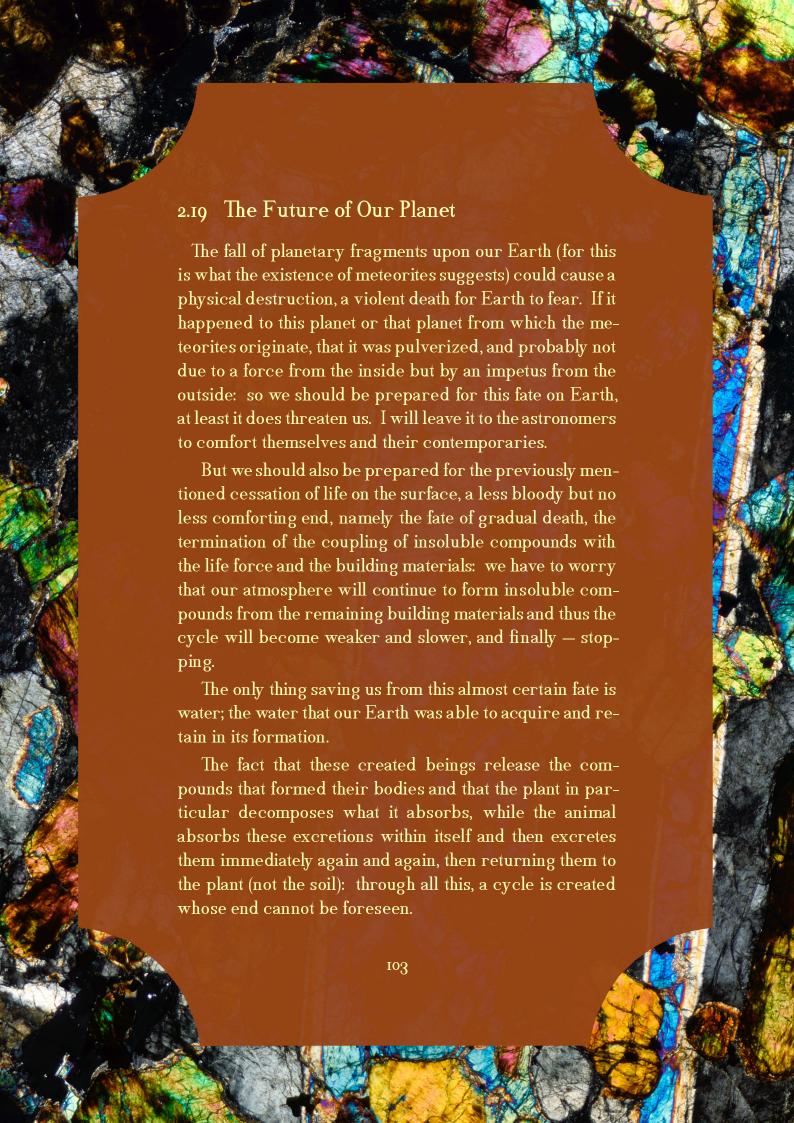


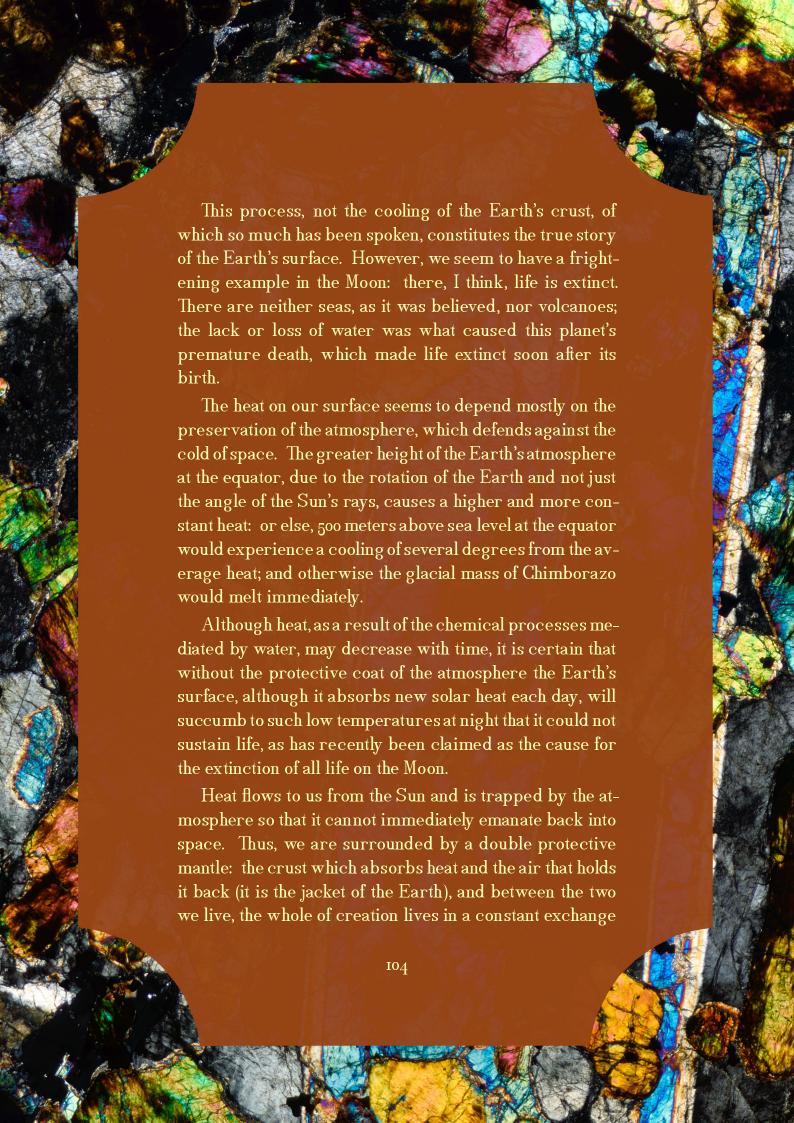






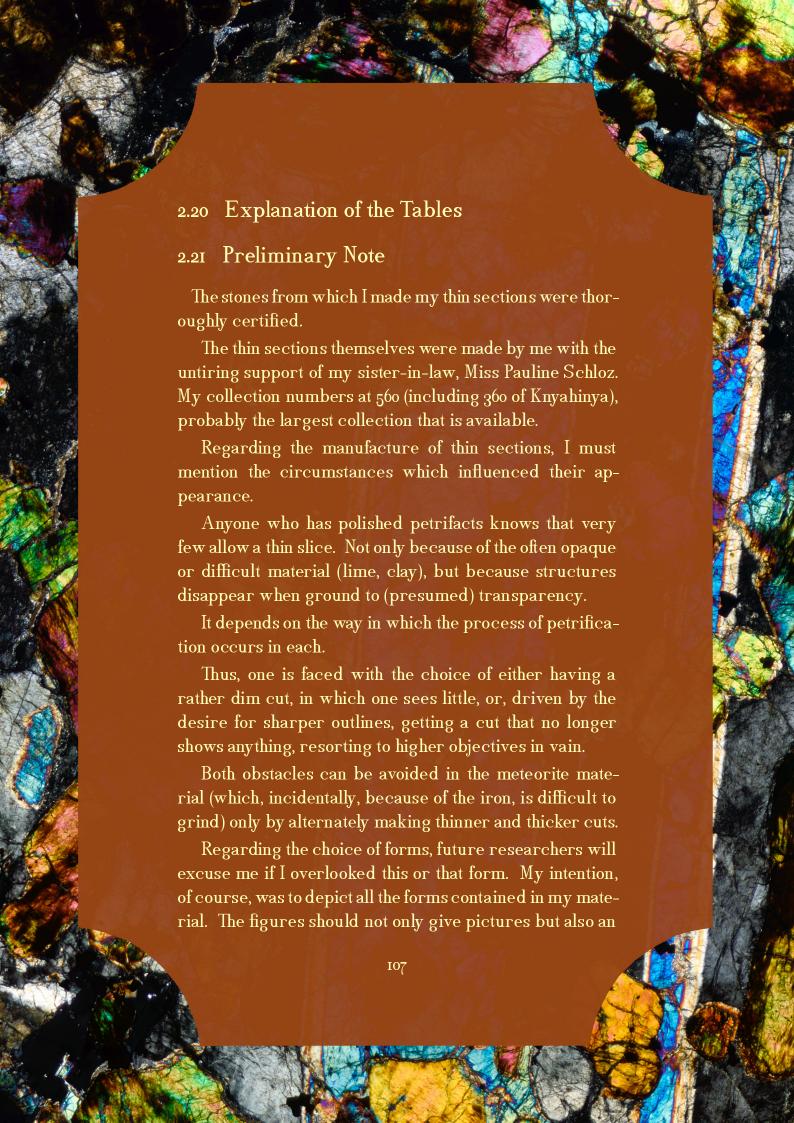


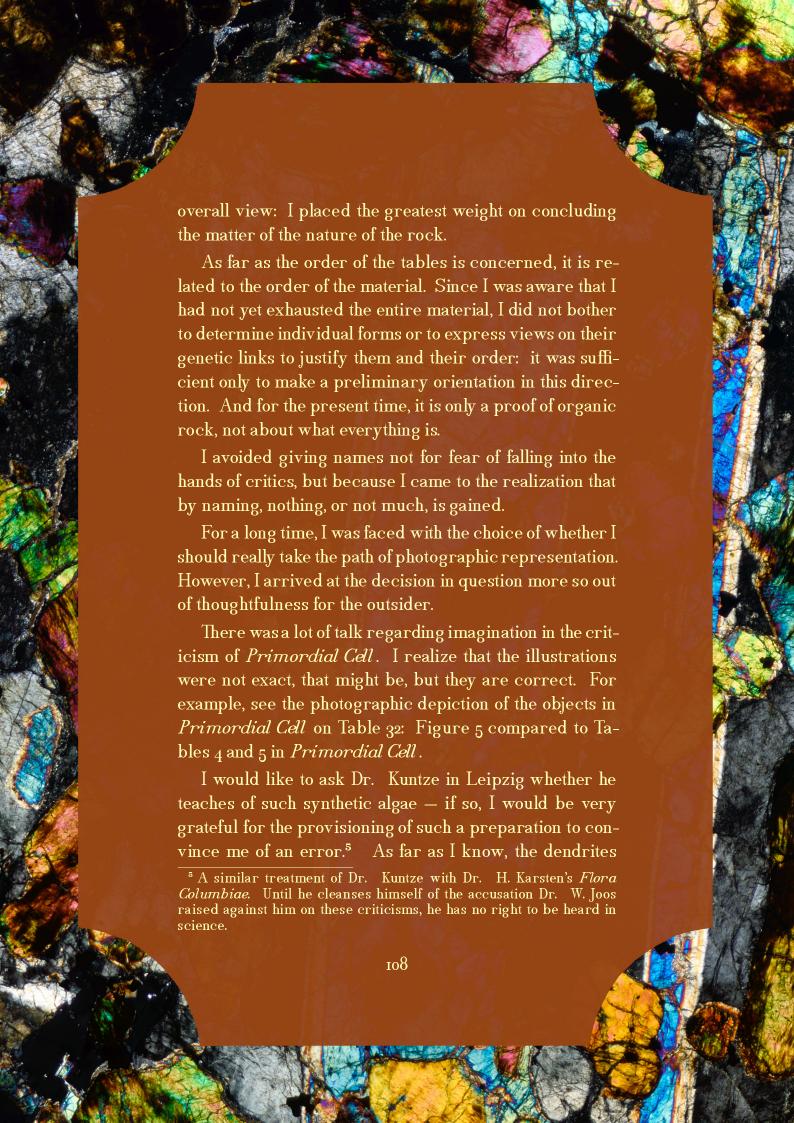




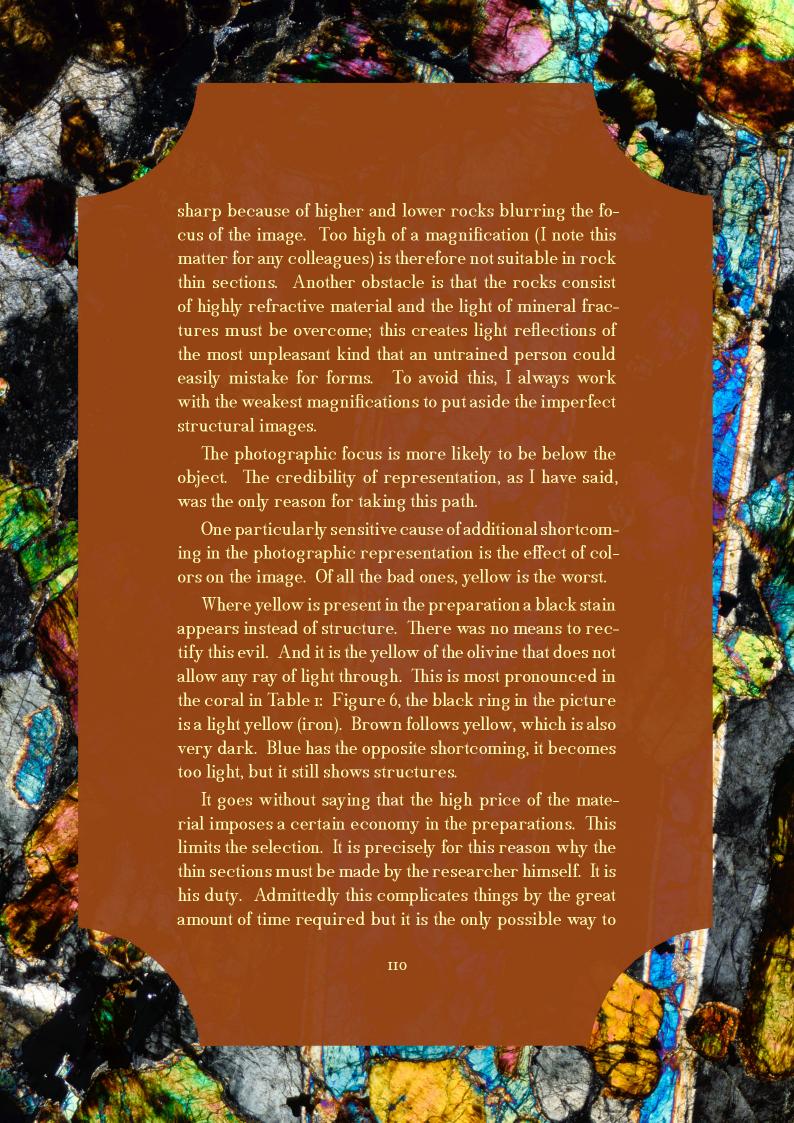
of substances. Here man lives, here the same beings arose which once laid the first foundation stone for the great construction of the Earth. These lower beings even today testify, by their enormous multiplication and preservation in a temperature in which higher beings would immediately die, to their being the first sculptors of the Earth itself. Thus, only if the source of light and heat itself were destroyed would life on Earth freeze; we have nothing to fear from the extinction of the fiery core of the Earth. For the preservation and metabolism of life, the Sun provides radiating light and heat. Light and heat are therefore mother and father to all living things; from before time they have prevented the organic from becoming inorganic, constantly forming new compounds. But even if so much light and heat should flow to the Earth, without the continuous activity and transformation of the organic cell life on our planet would be numbered in years.4 The origin of the planets is the cell, it is maintained so long as light rays hit the Earth. It is possible that over time changes in the chemical composition of the Earth's surface and atmosphere will occur due to the precipitation of solid compounds, whereby building materials are removed from the cycle. Certainly, under such modified living conditions, other similar, and (according to previous experience) higher organized beings will emerge. Indeed, it can be imagined that there will be a refinement of organisms here on Earth, in the same proportion as occurred after the olivine-granite period, <sup>4</sup> The loss of geothermal heat or heat radiated by the Sun would not be the next threatening nightmare, but the disappearance of our atmosphere. 105

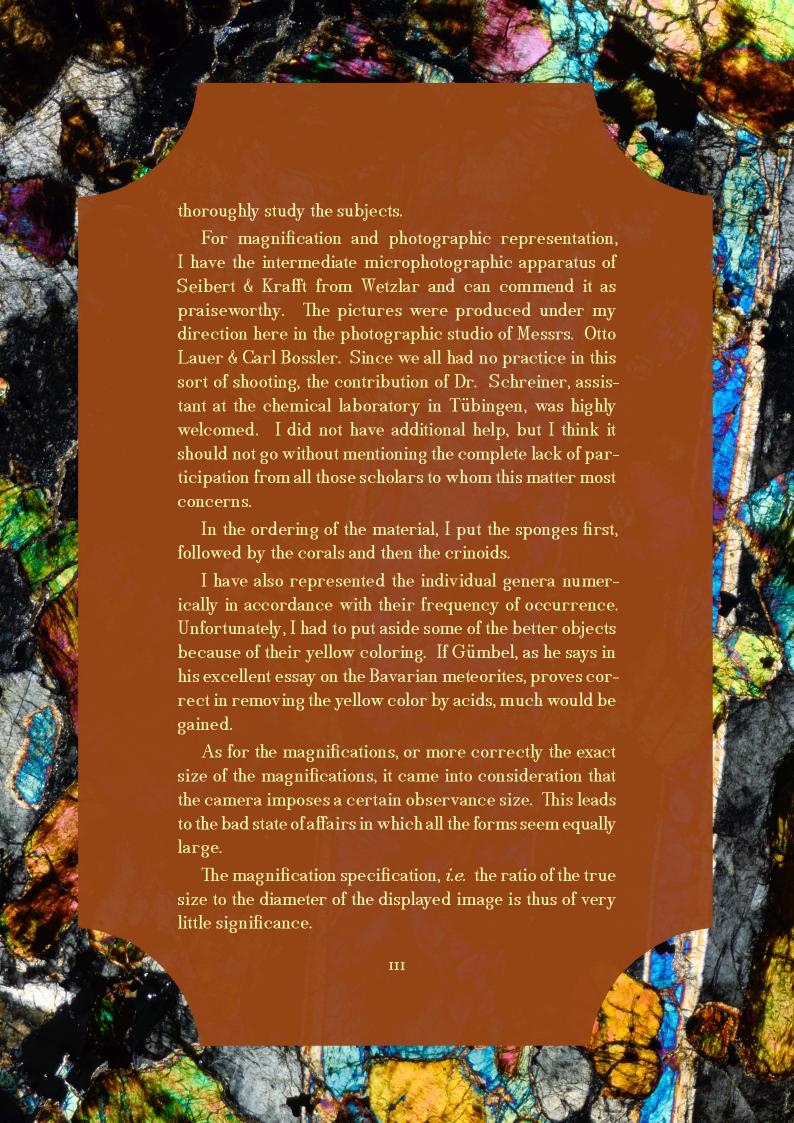




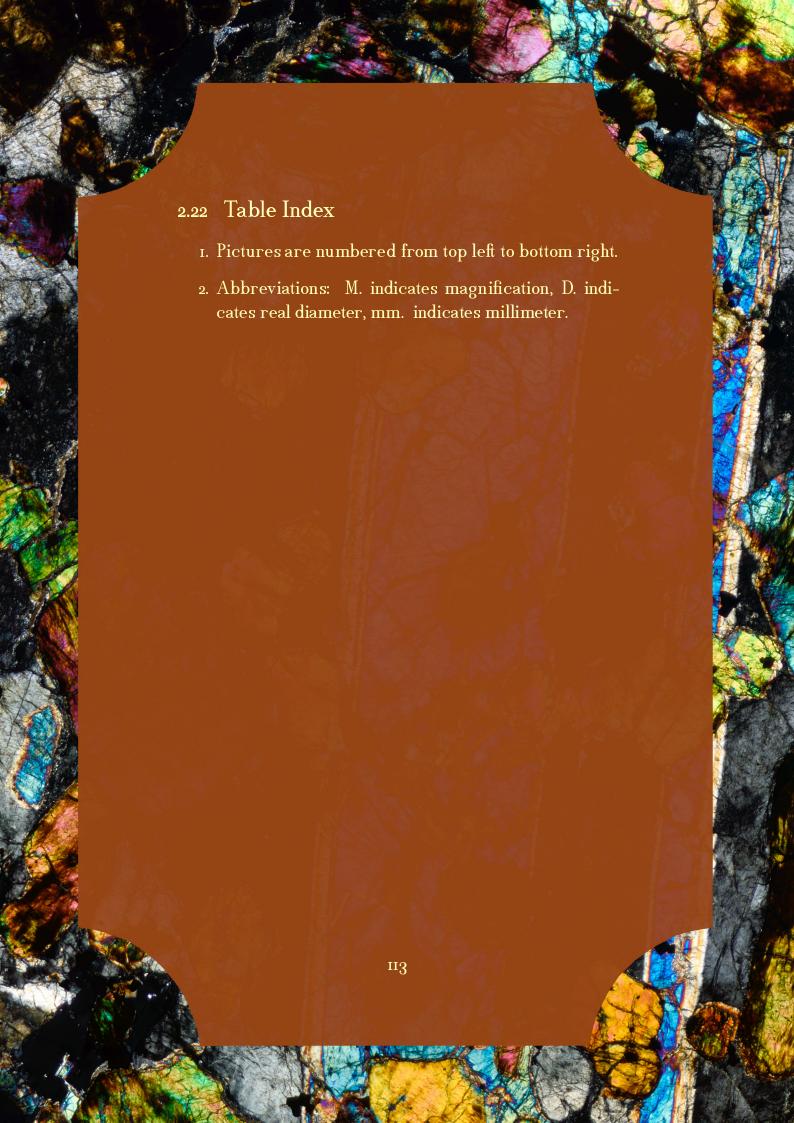






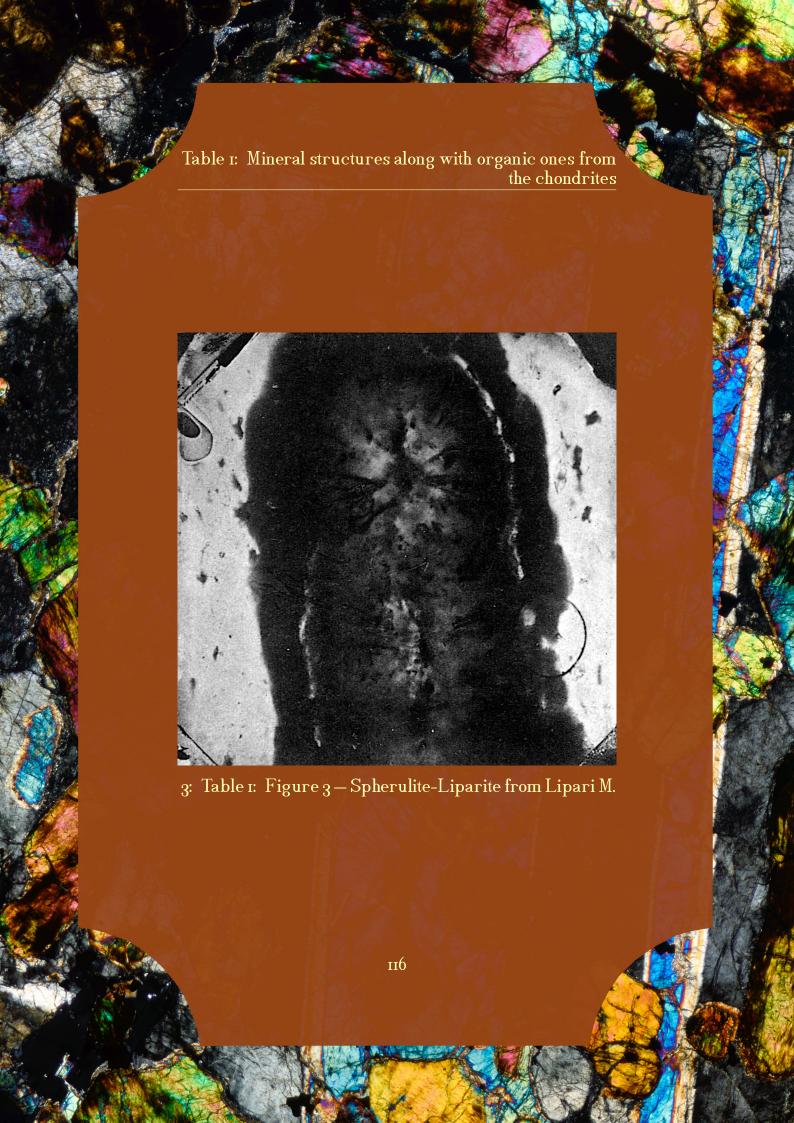


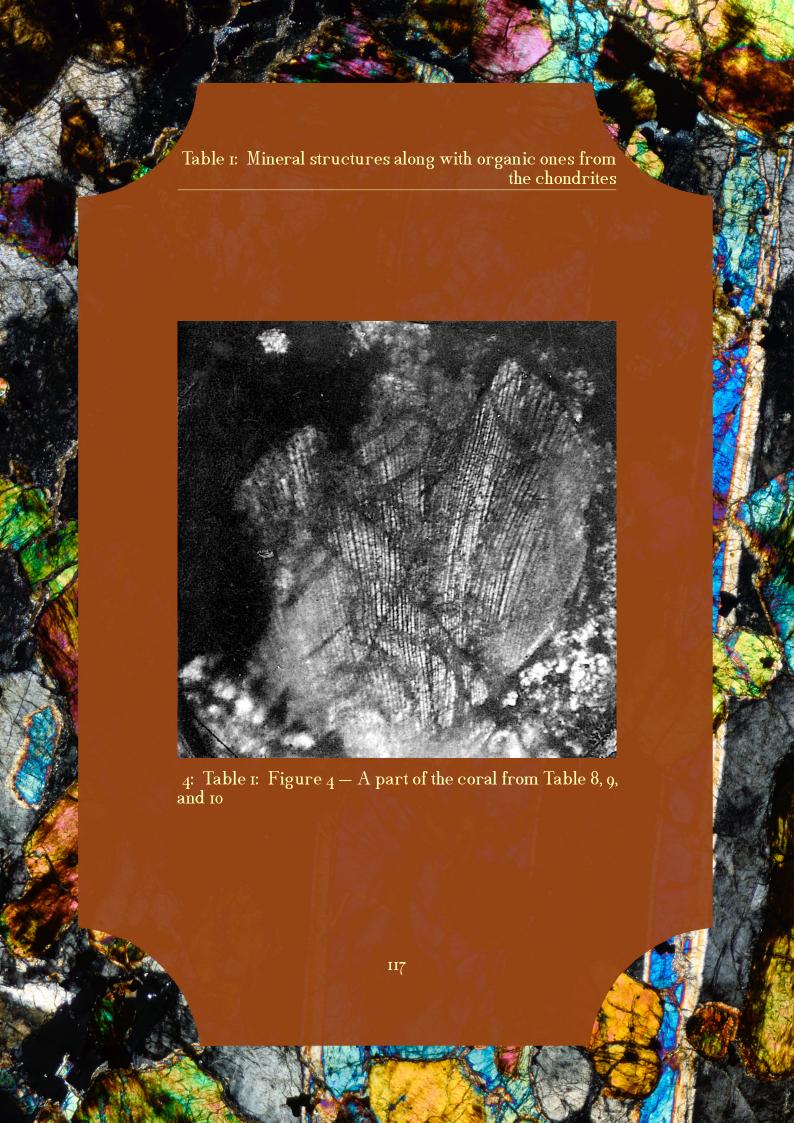


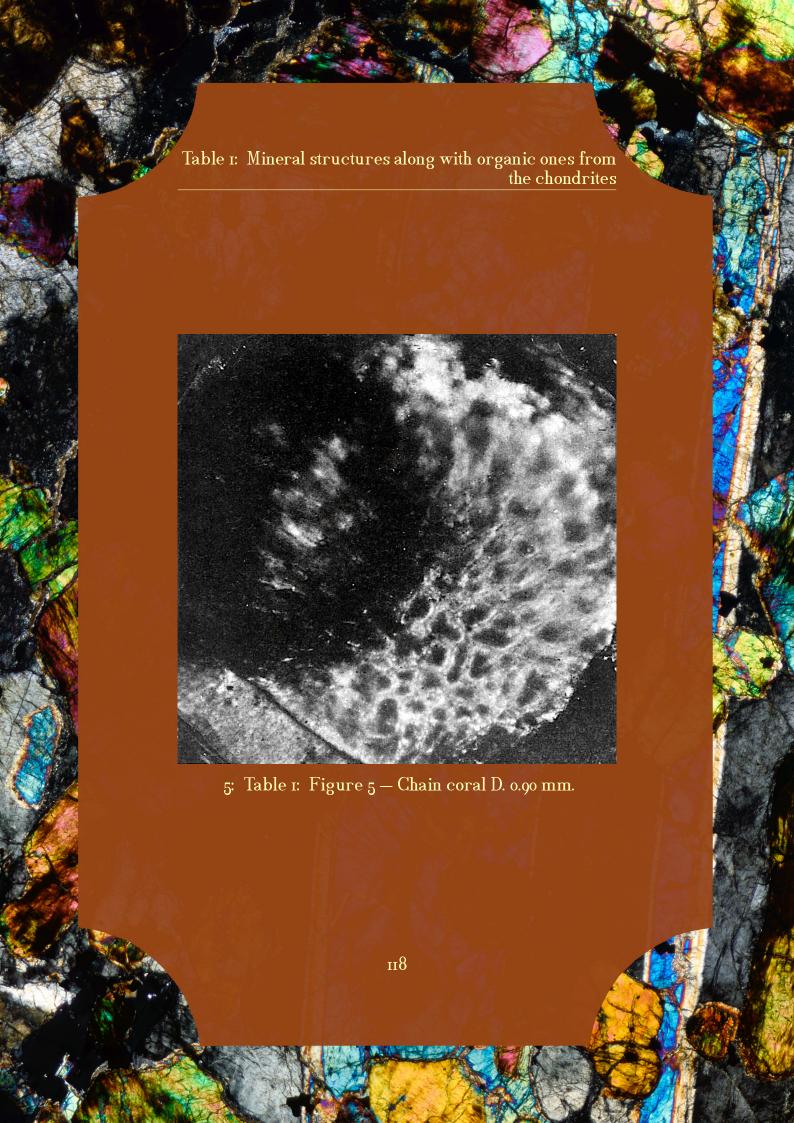


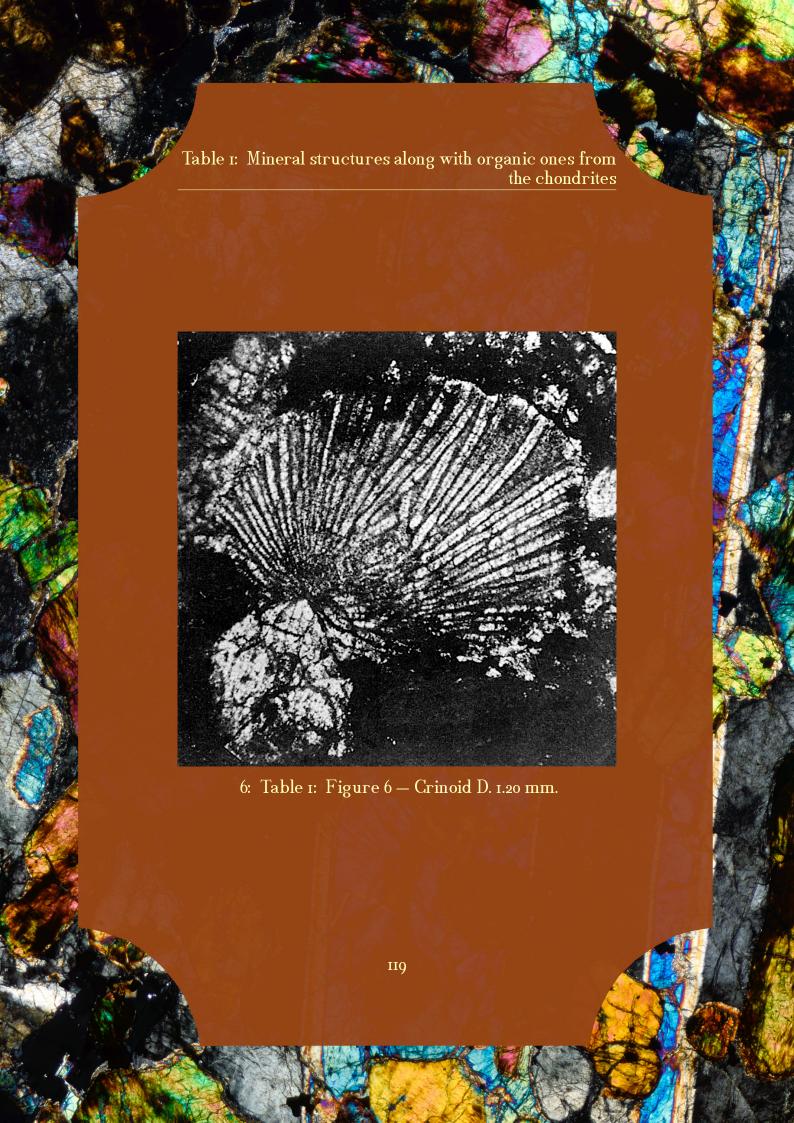




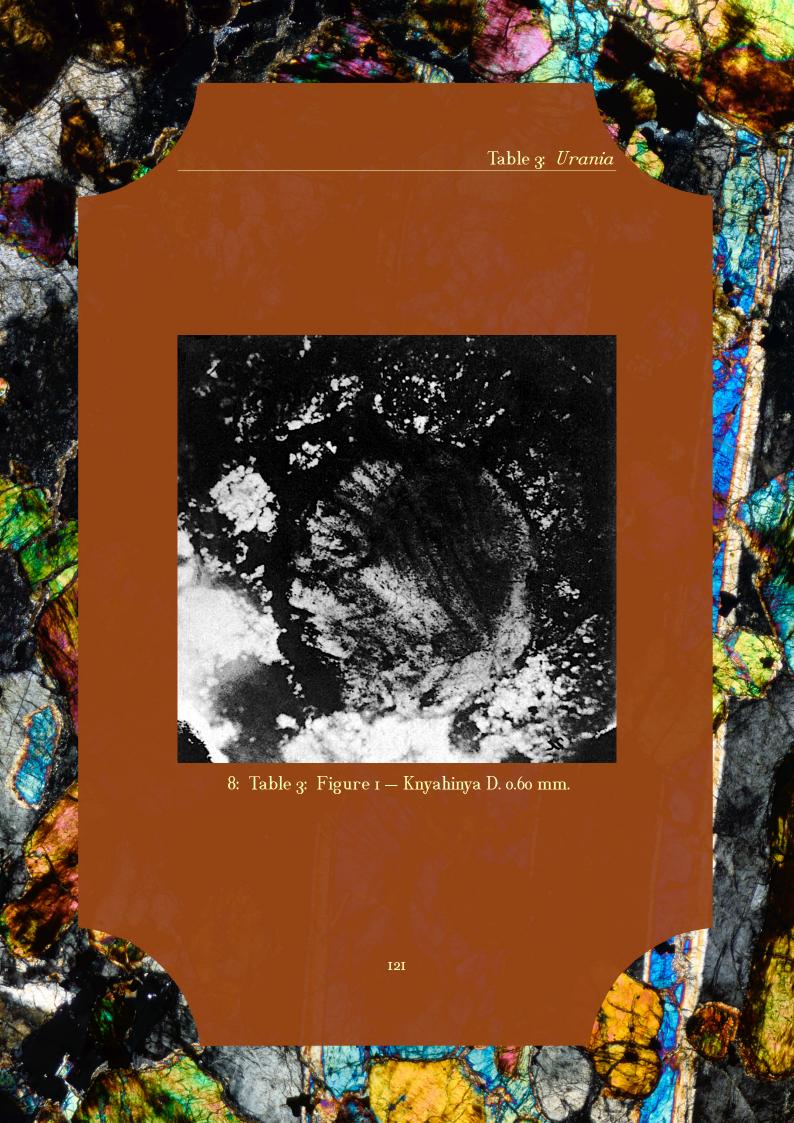


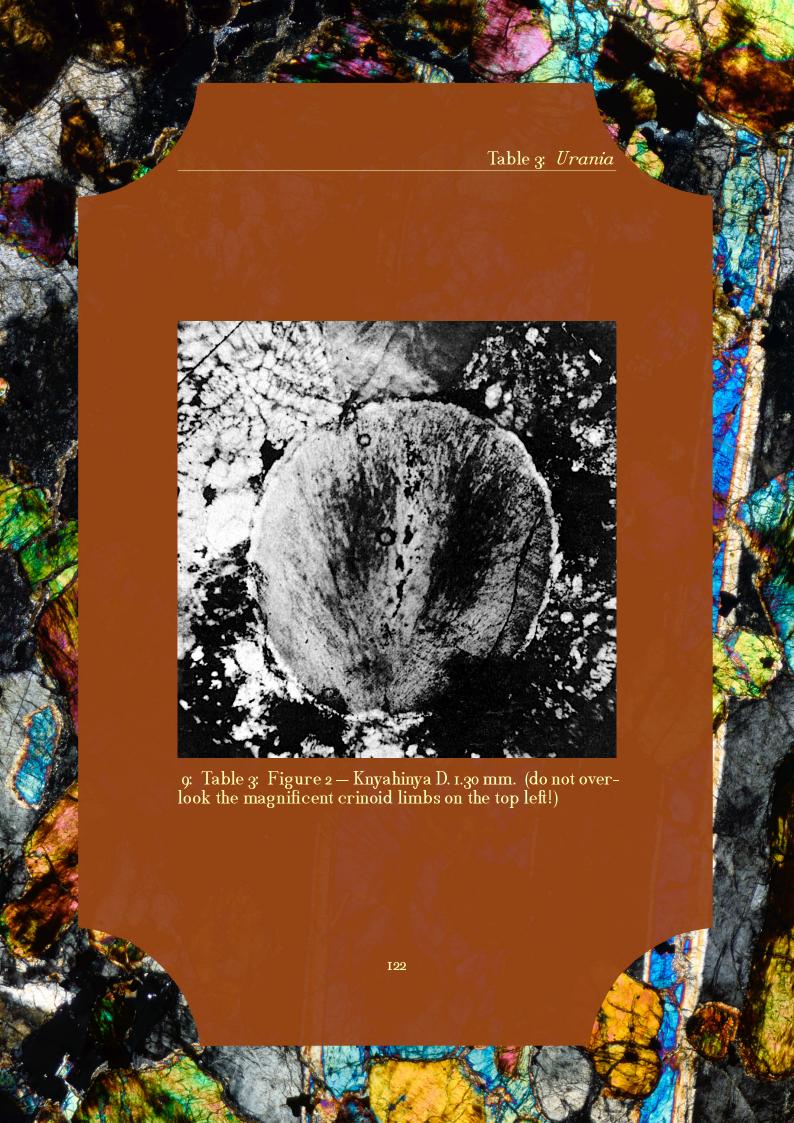


















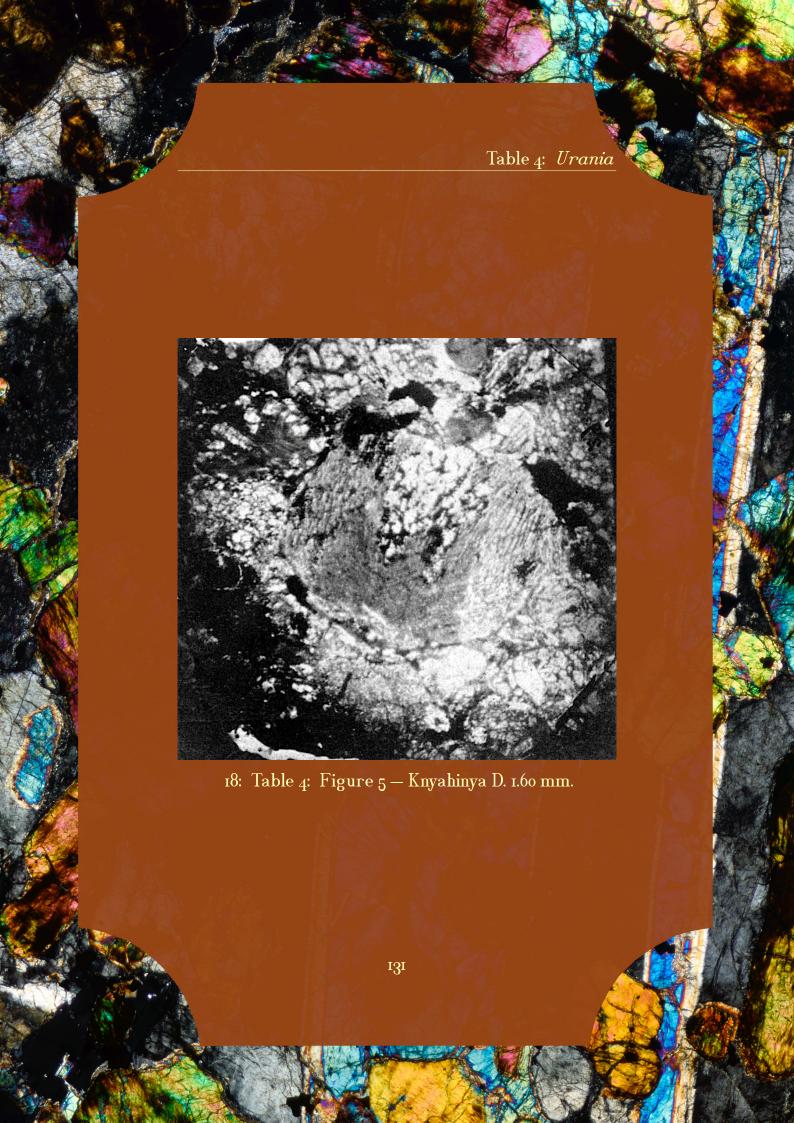






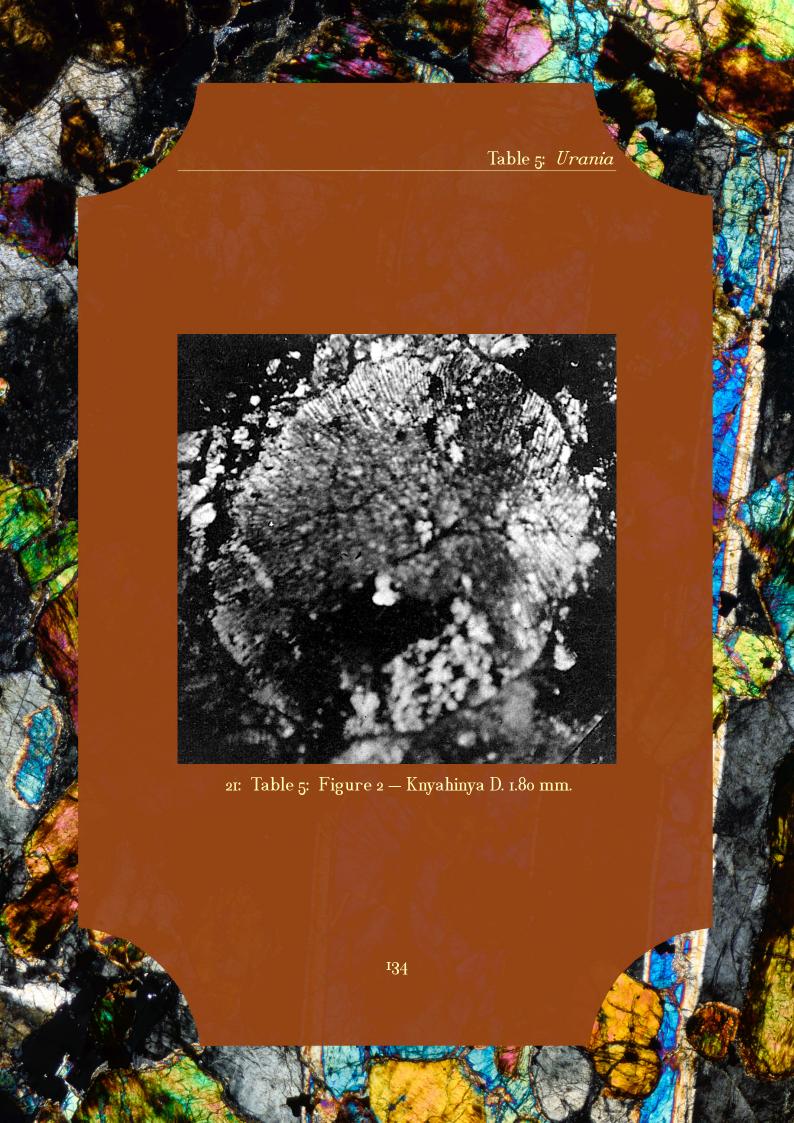




















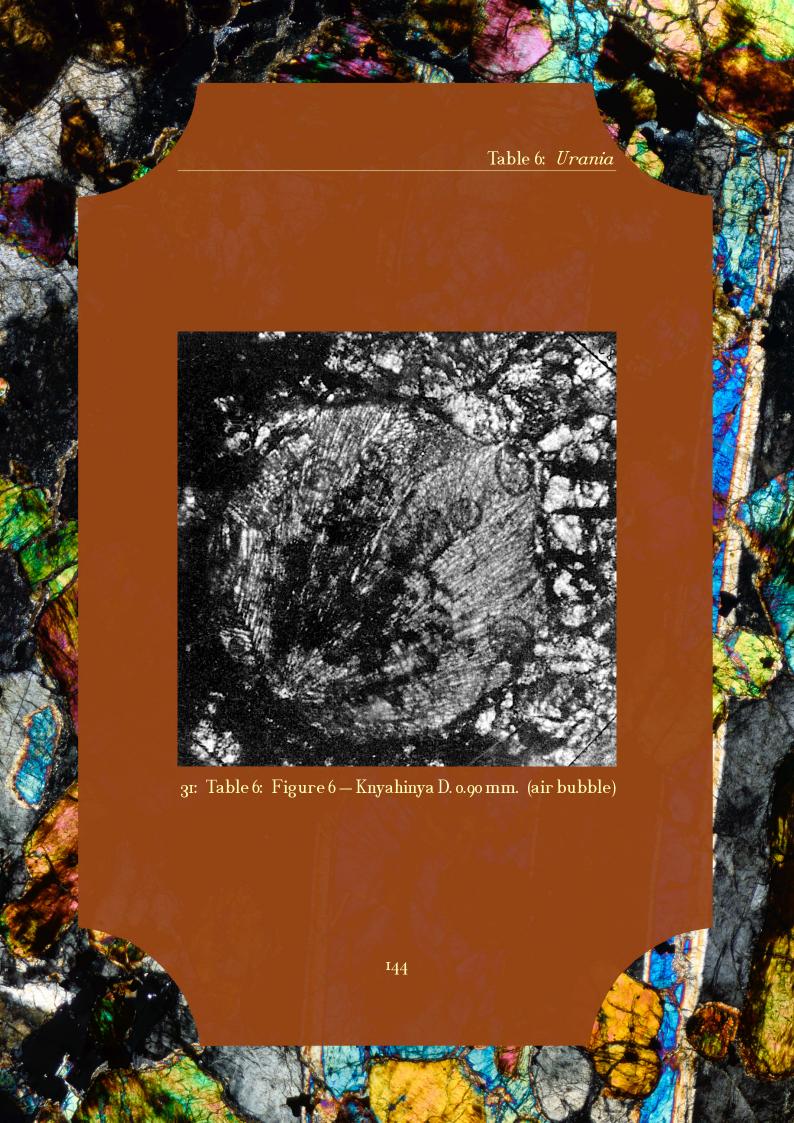


















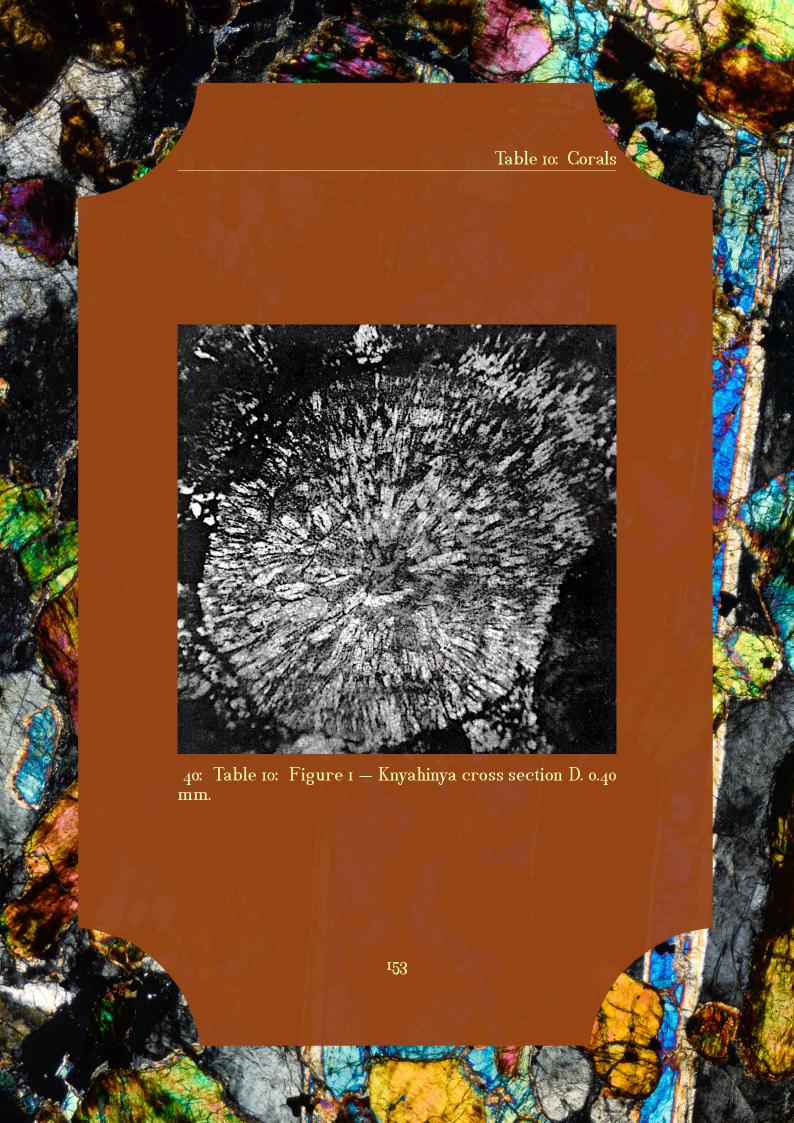






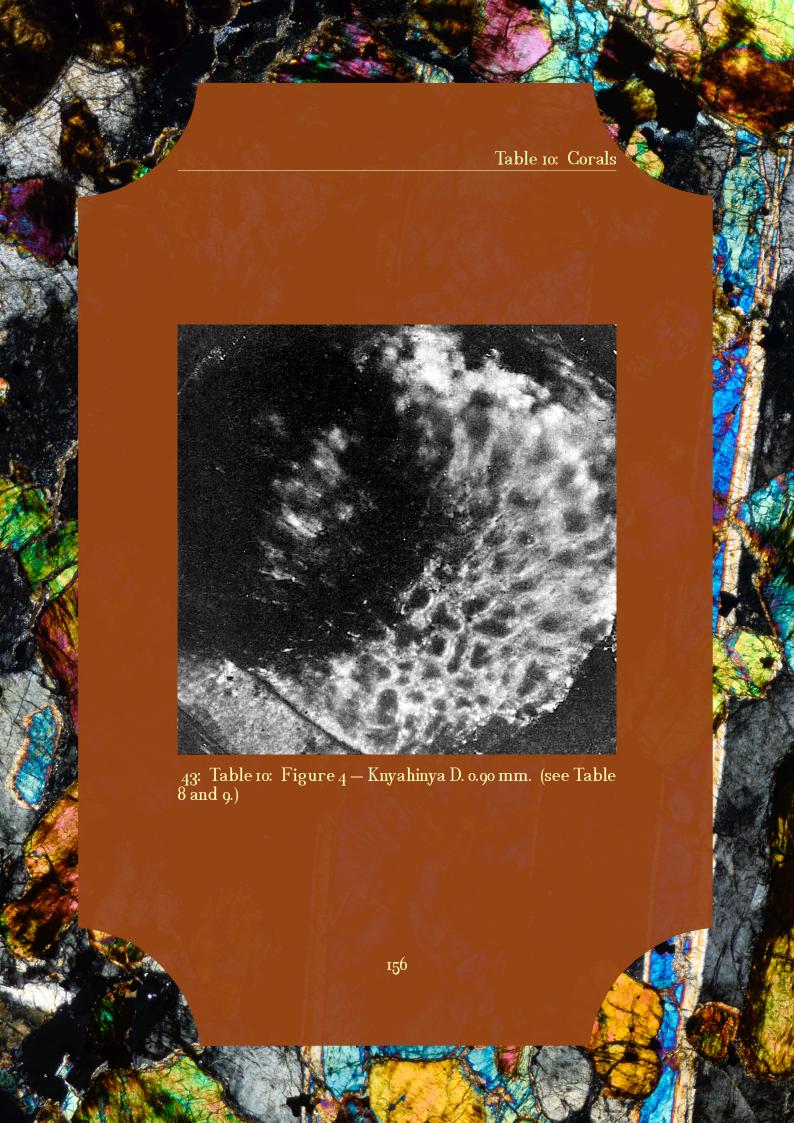












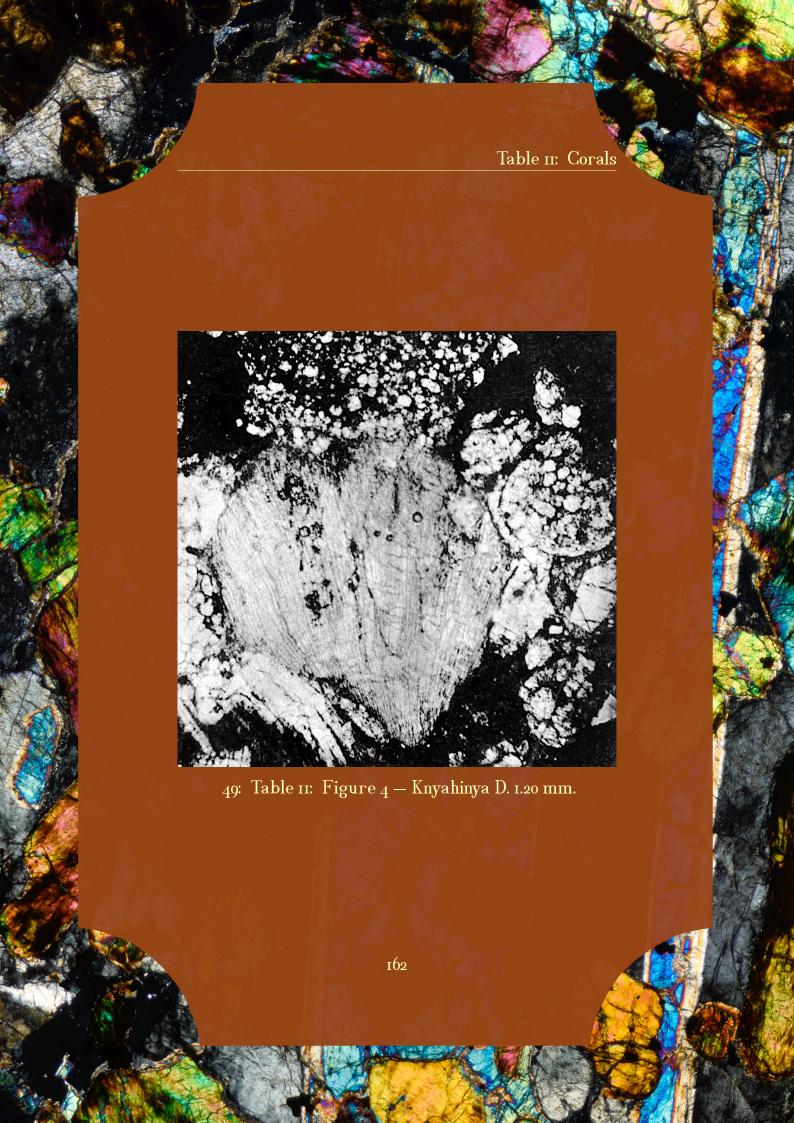






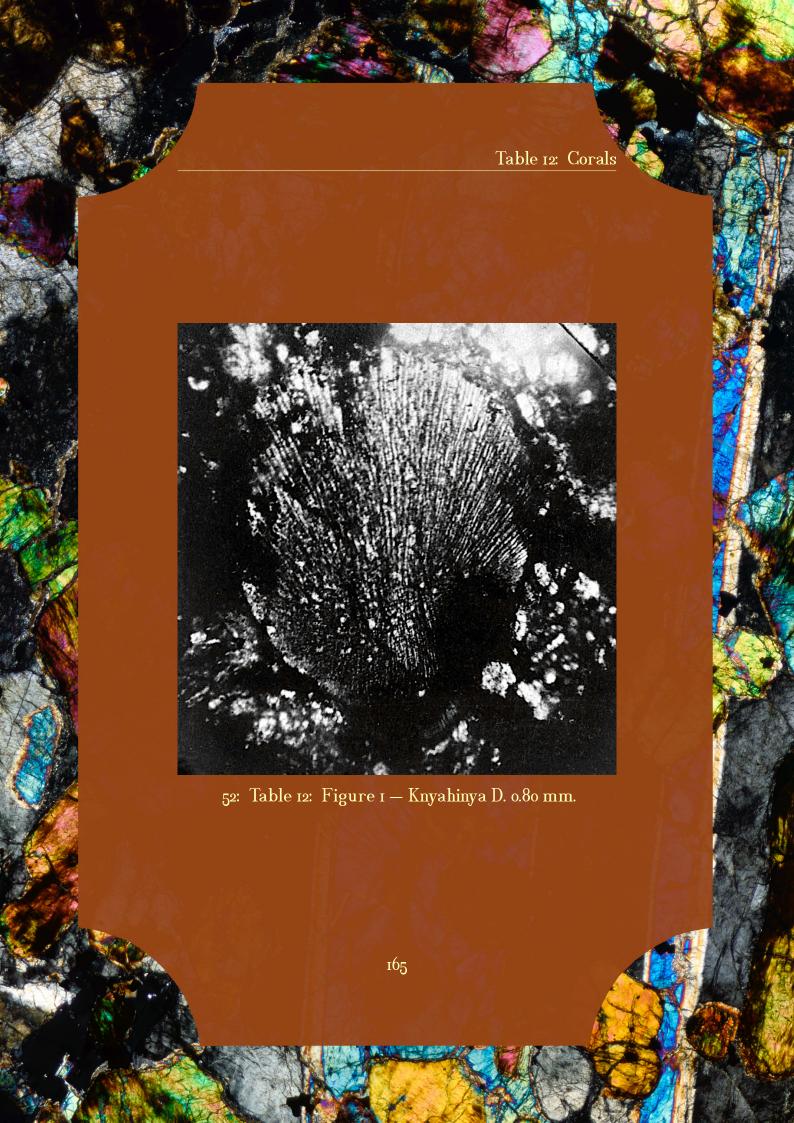














































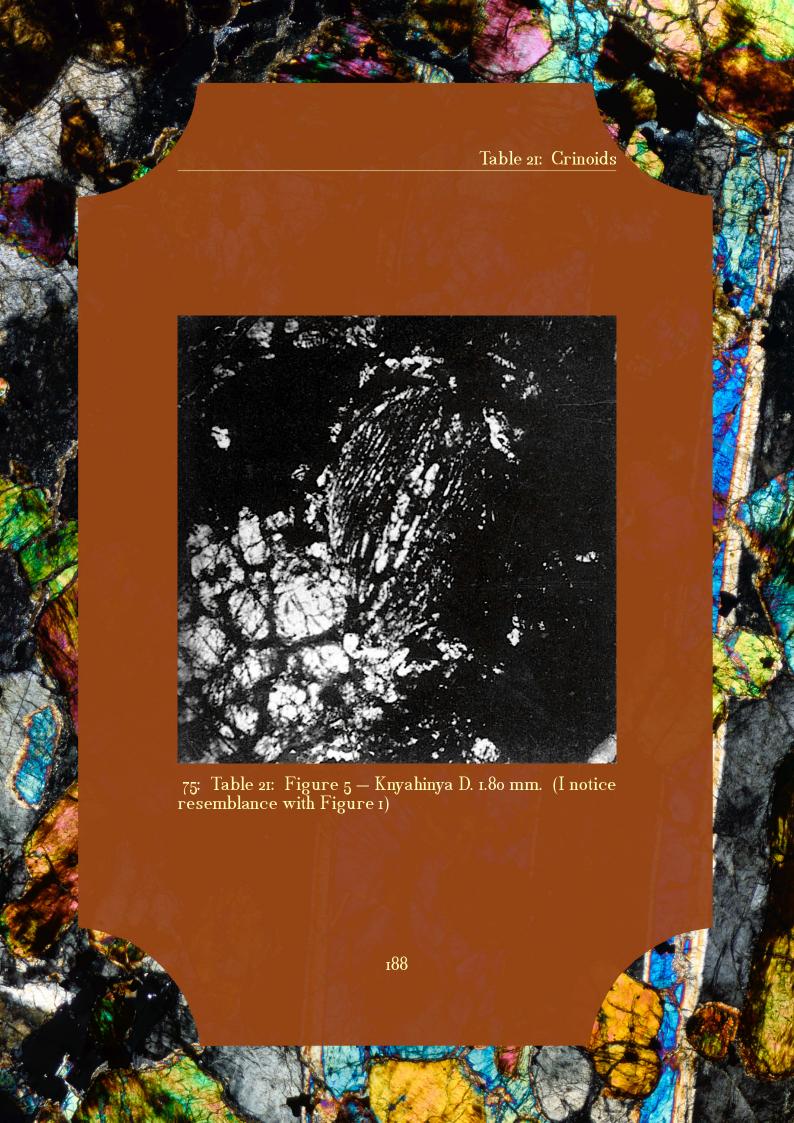




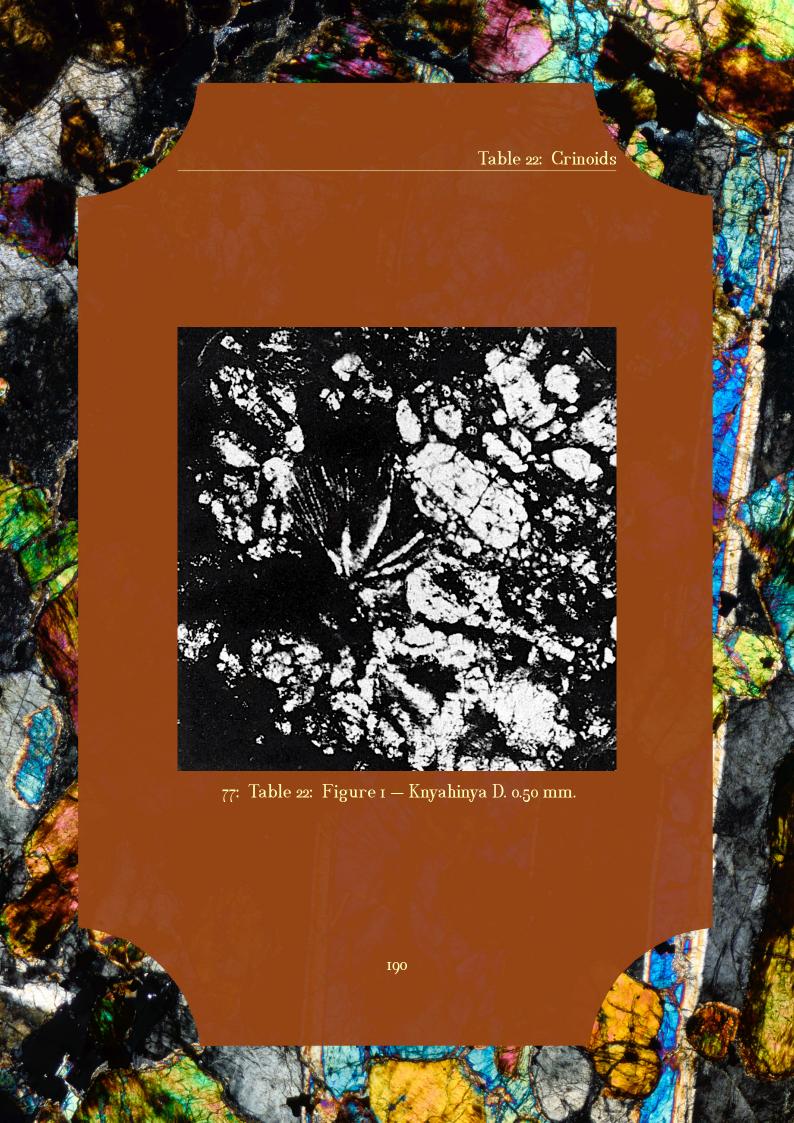








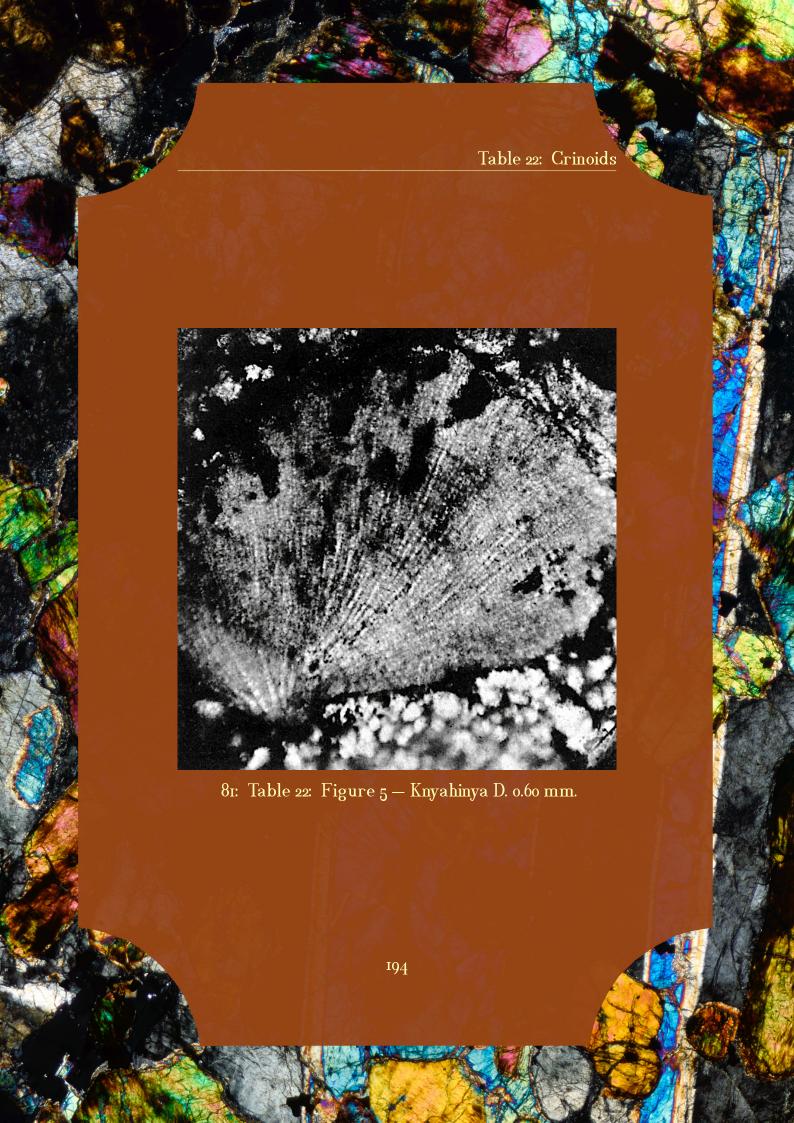










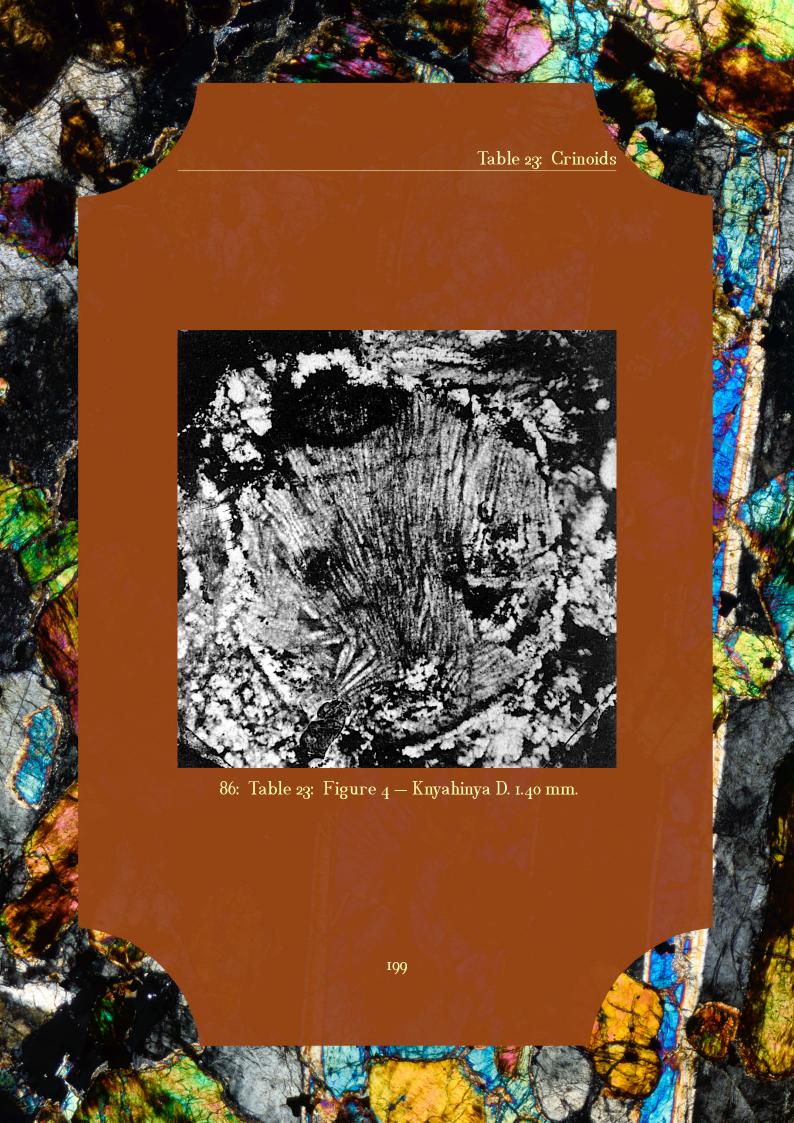












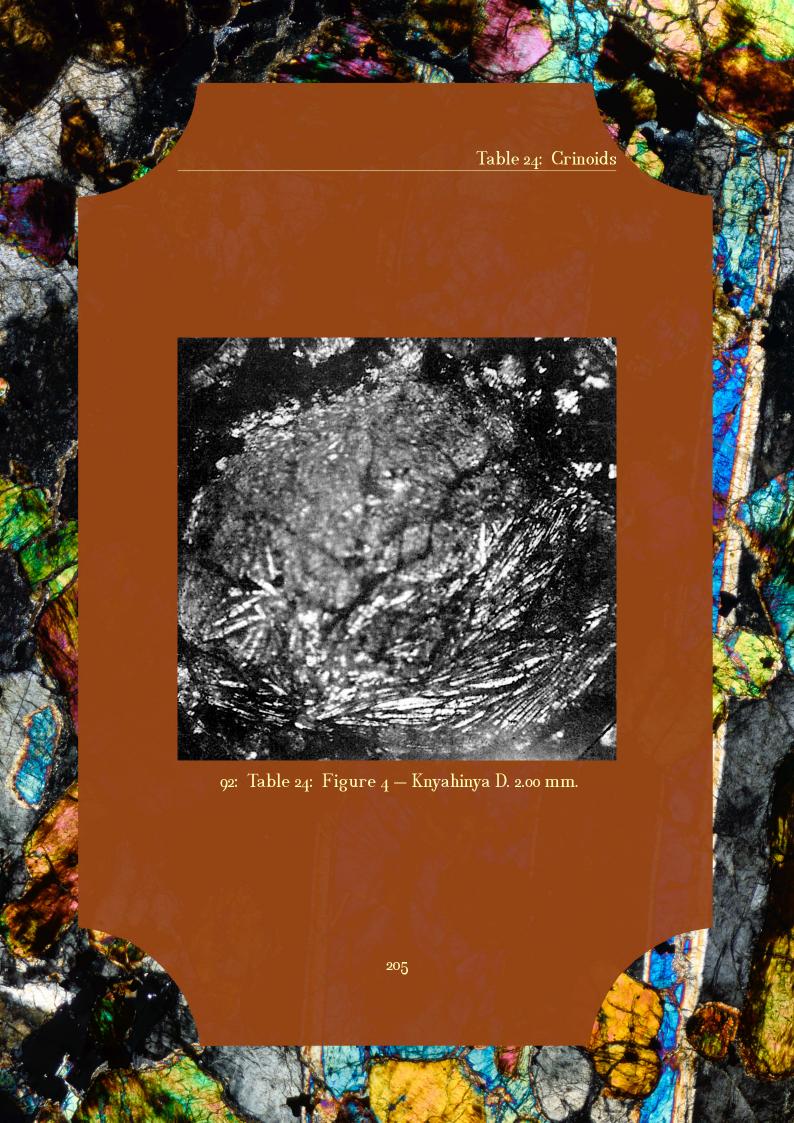










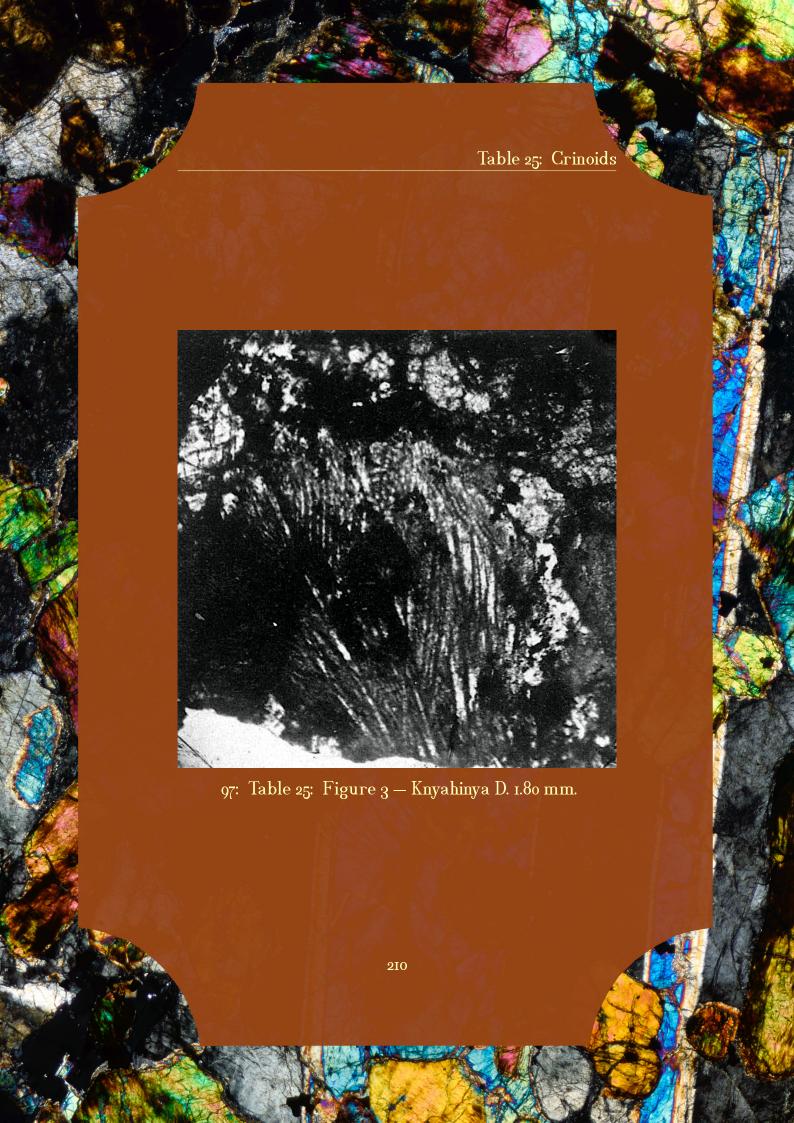










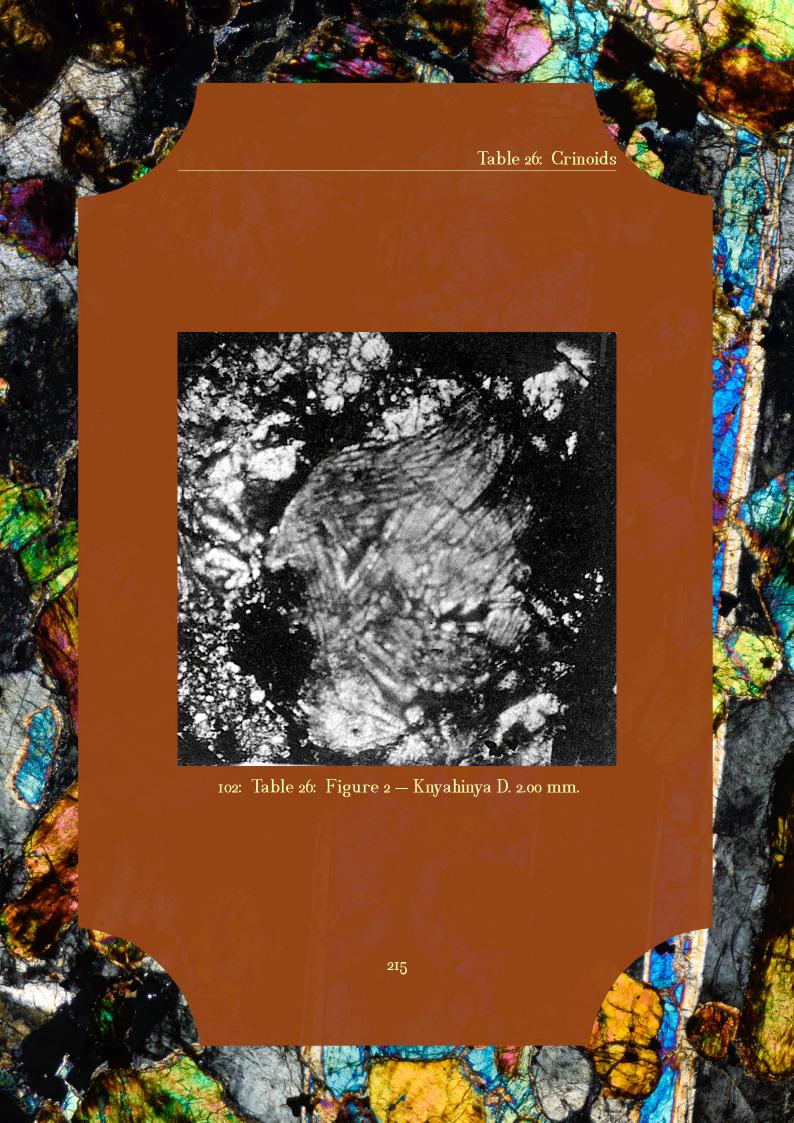


















































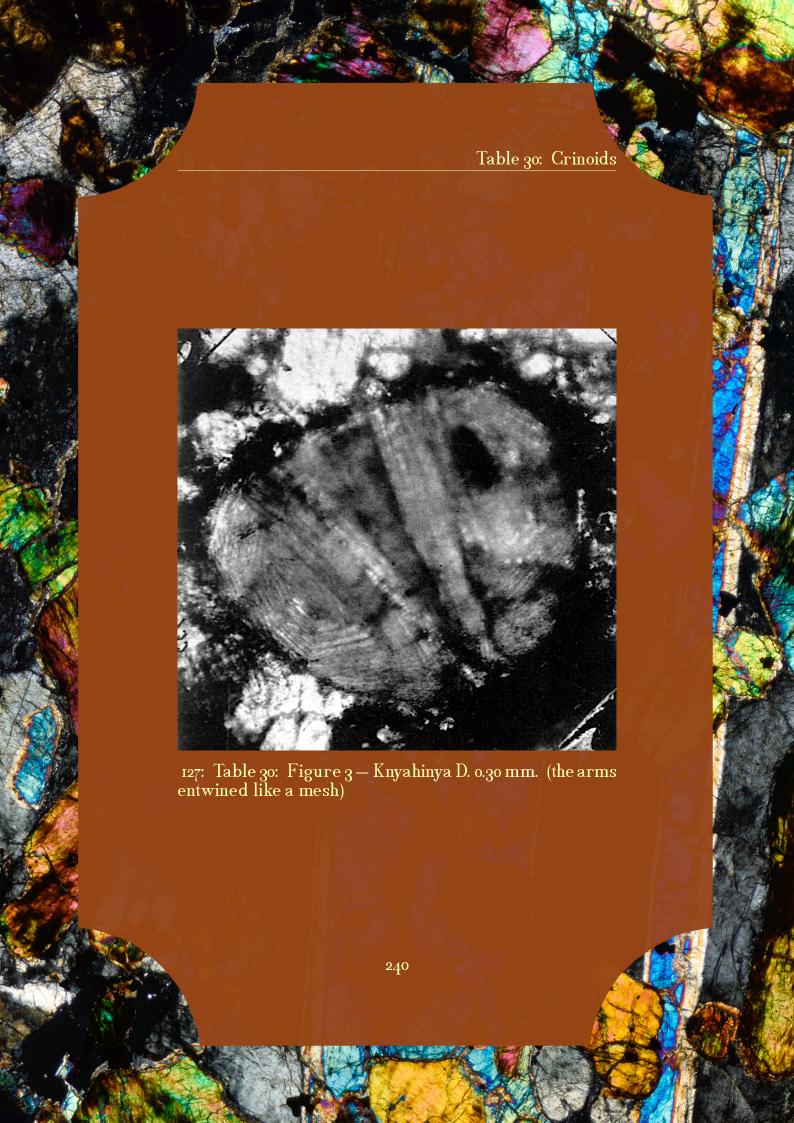






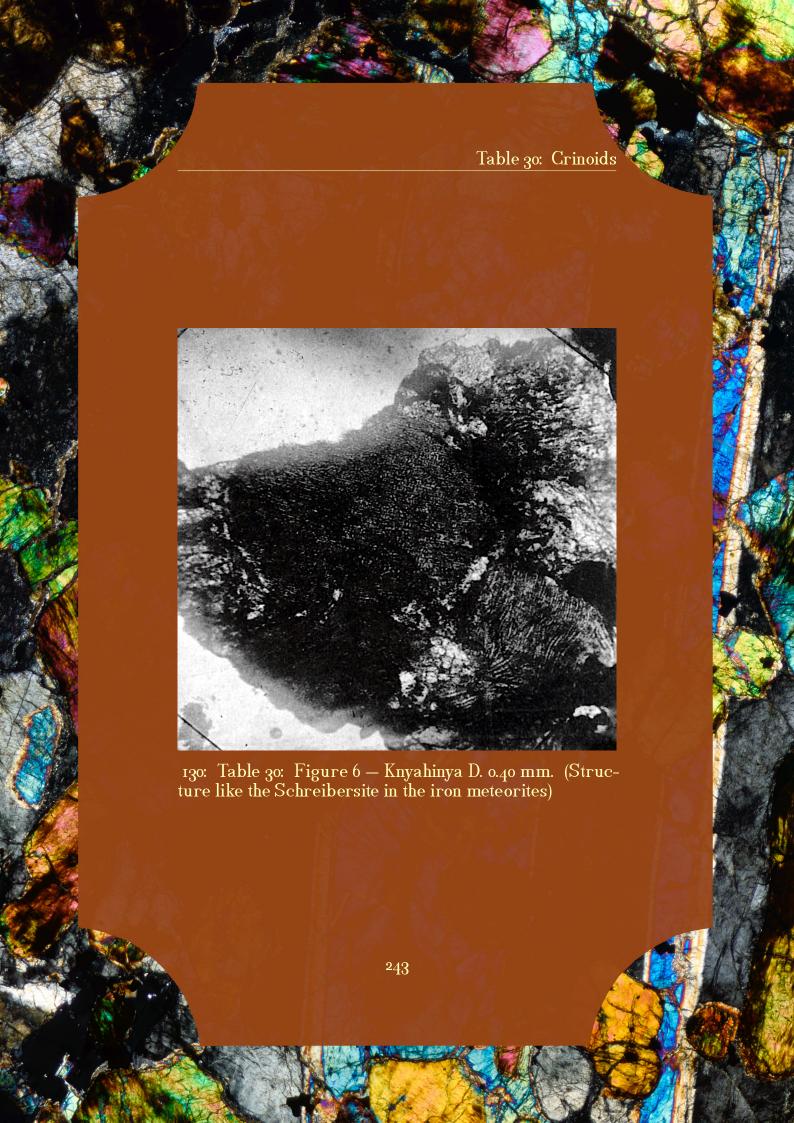




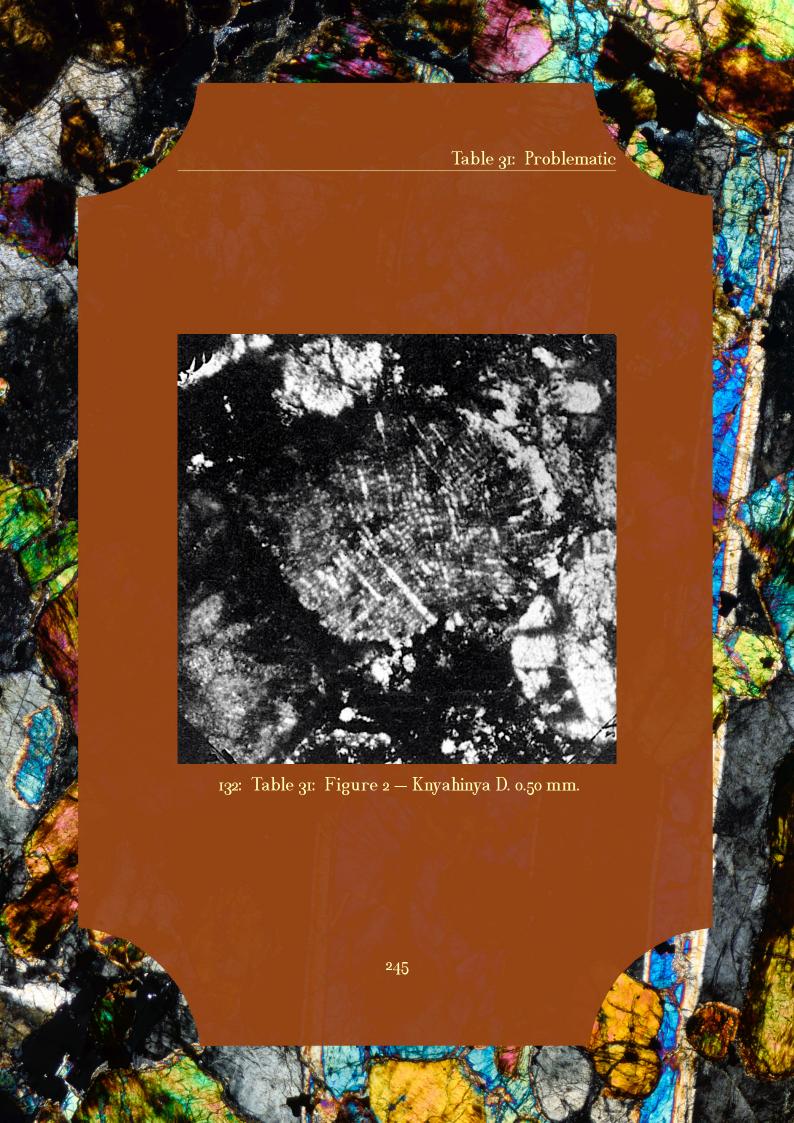


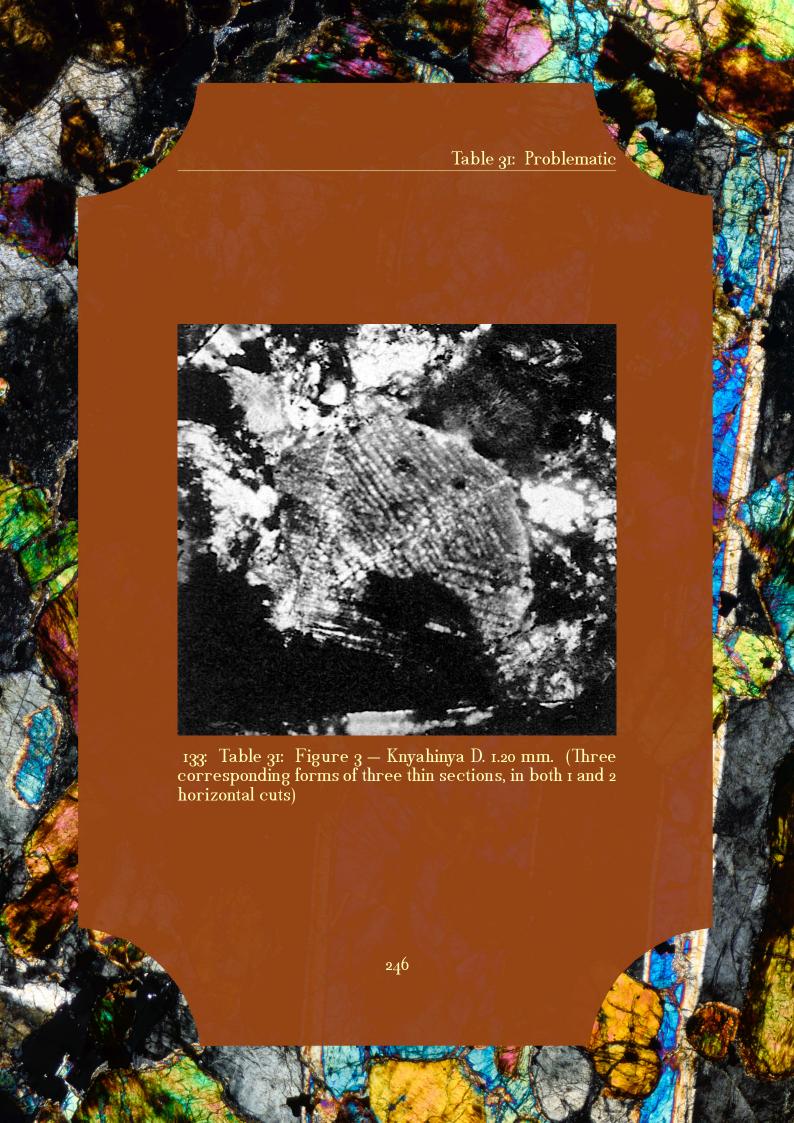








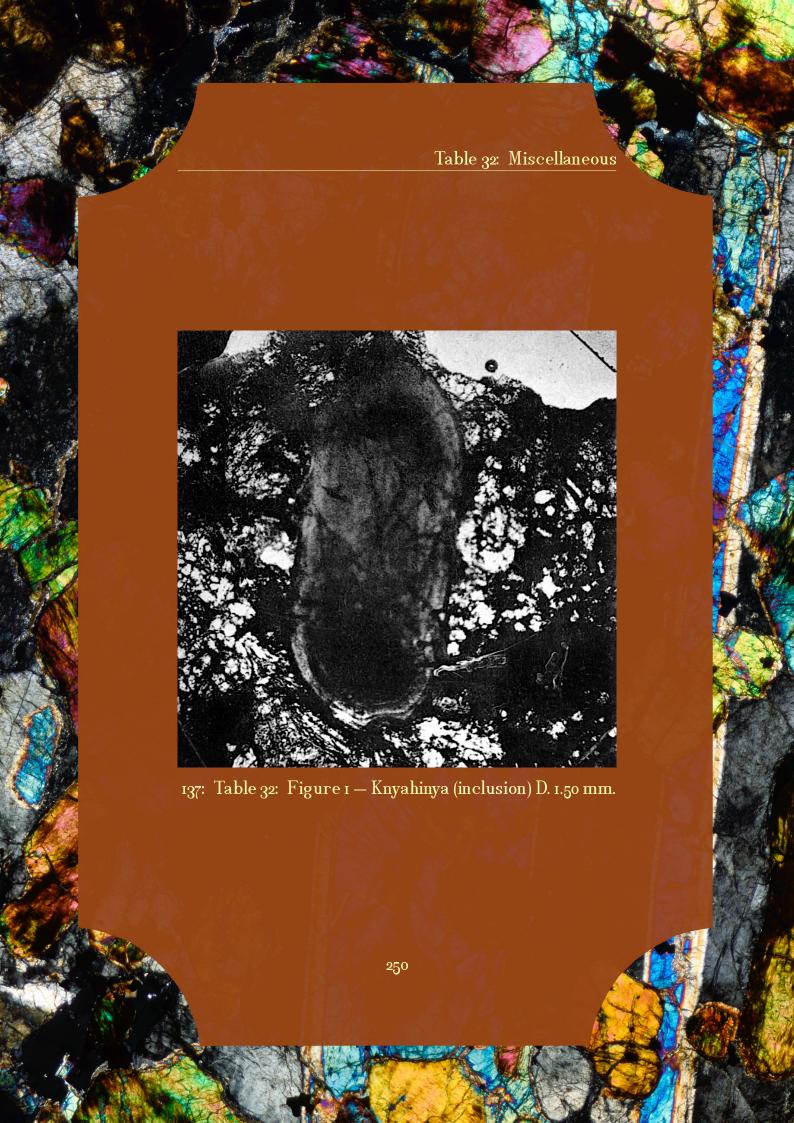














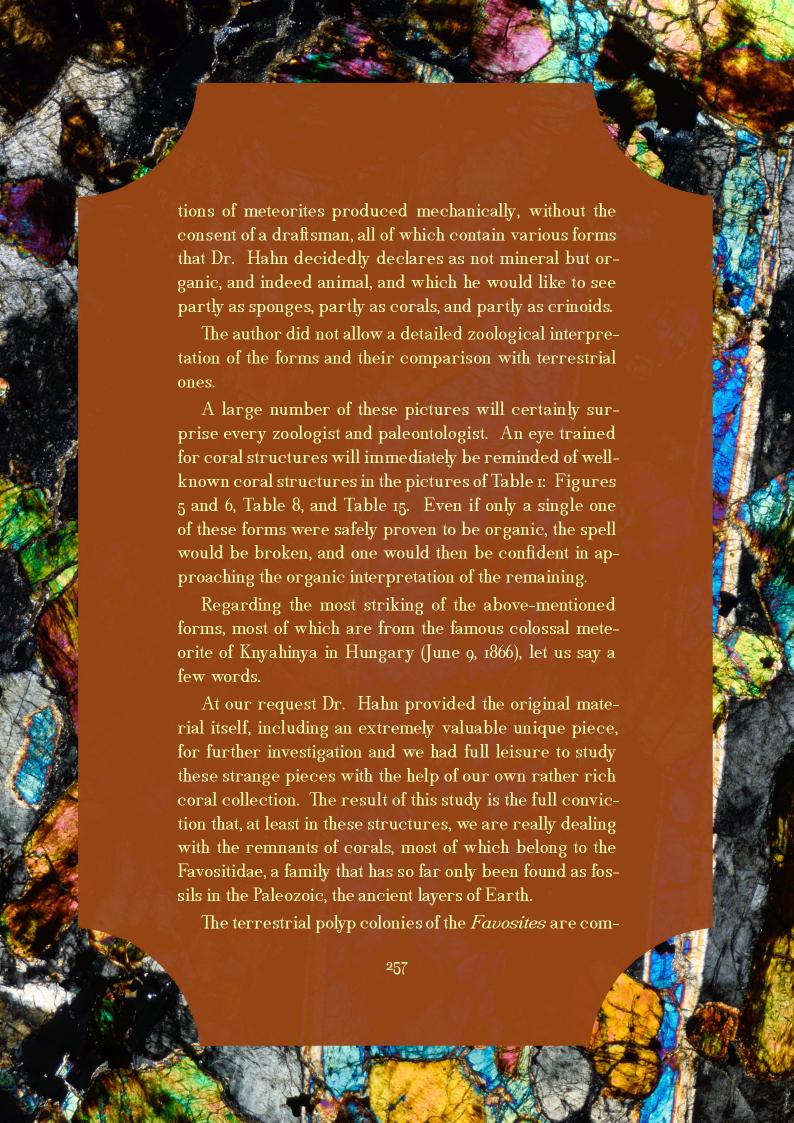


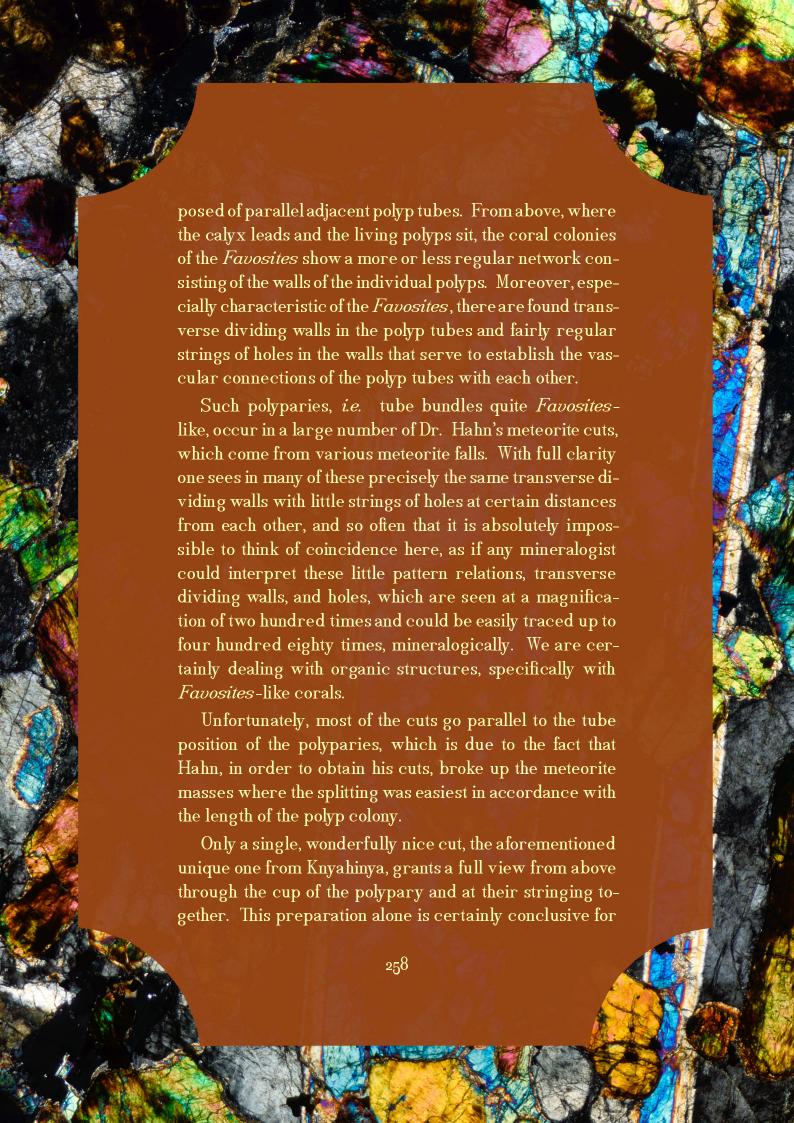


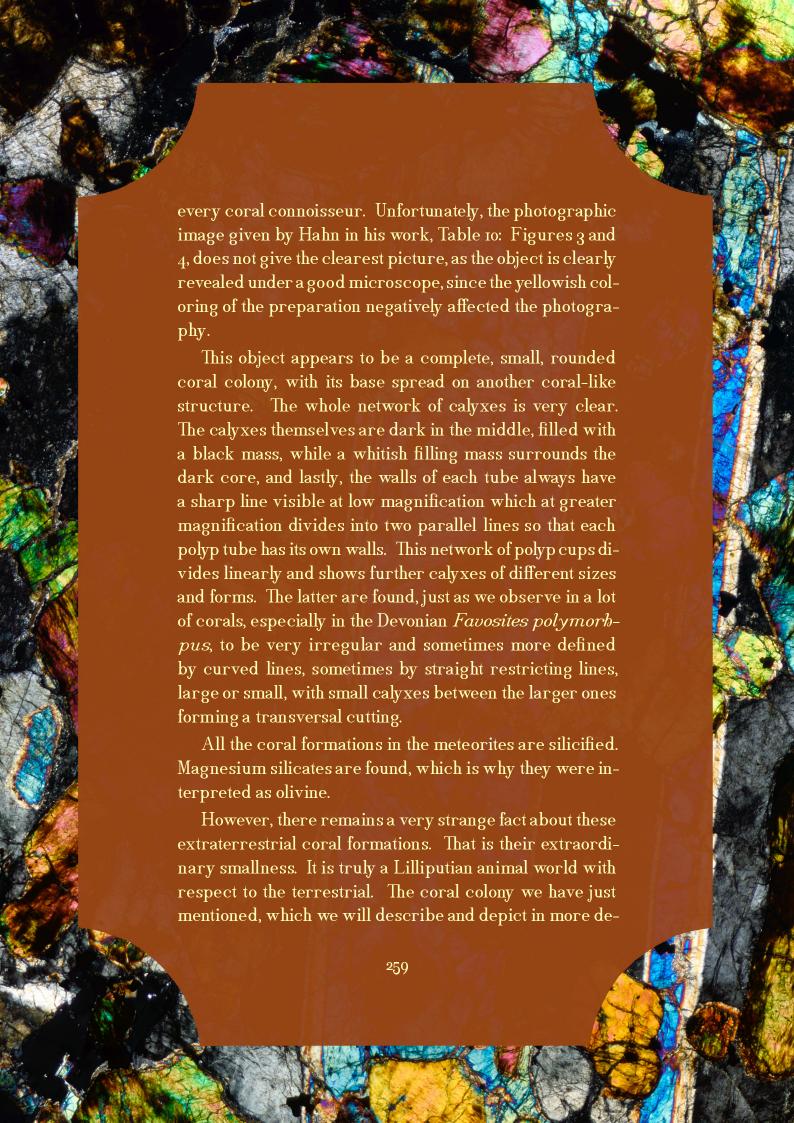




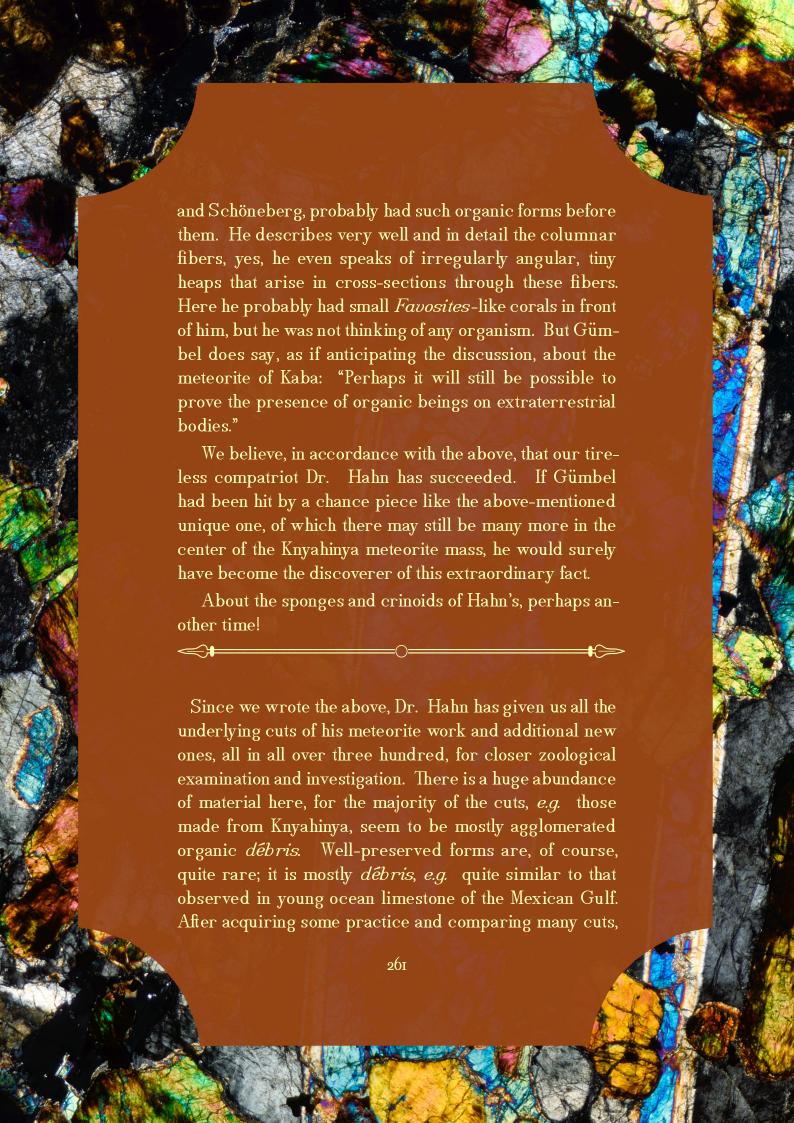


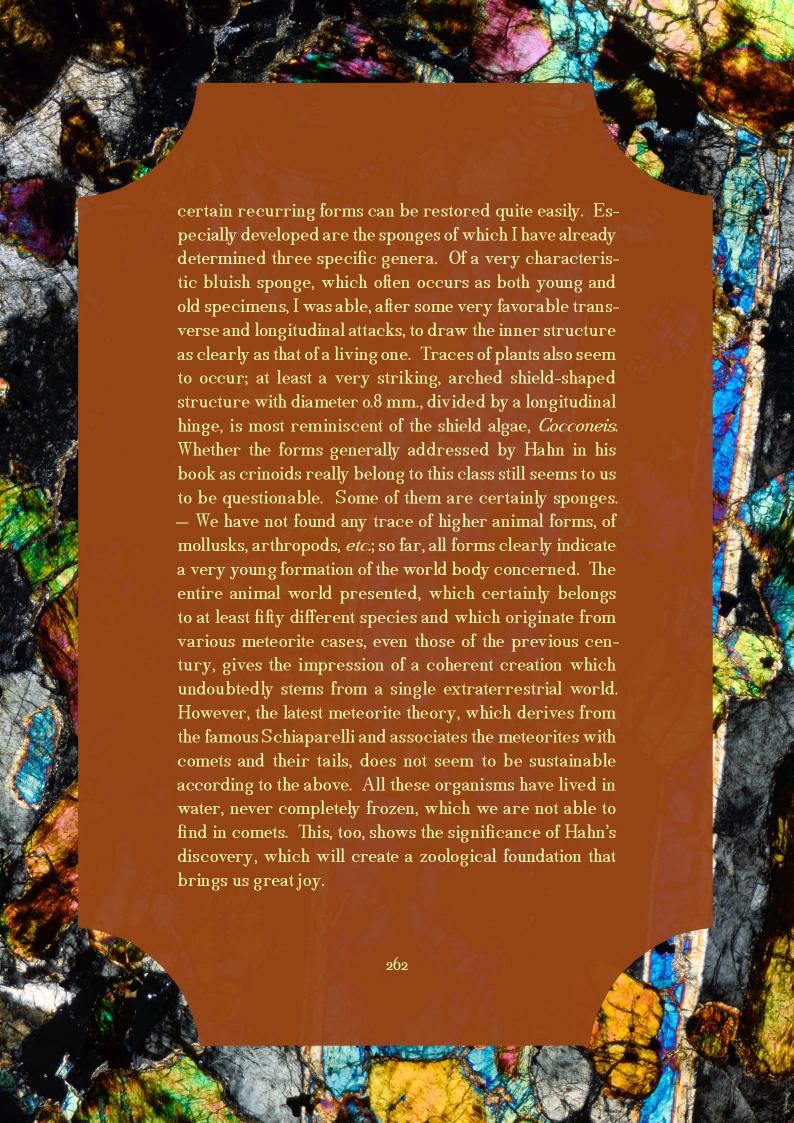


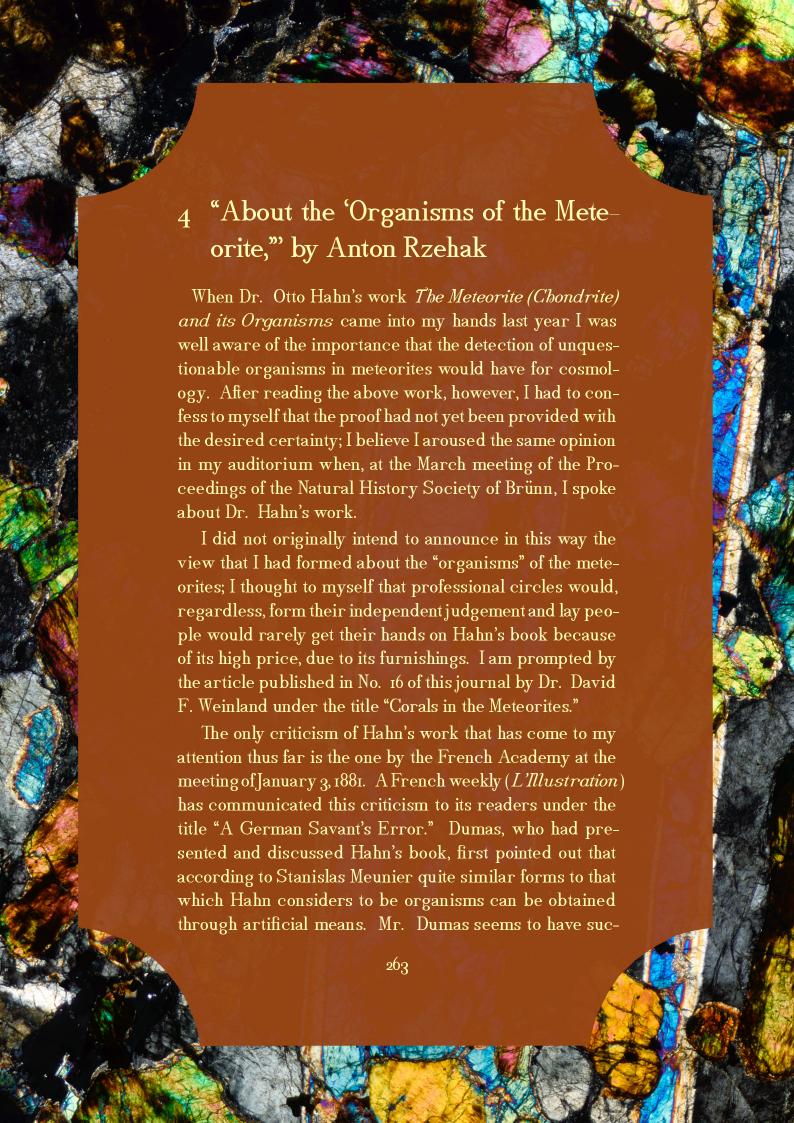


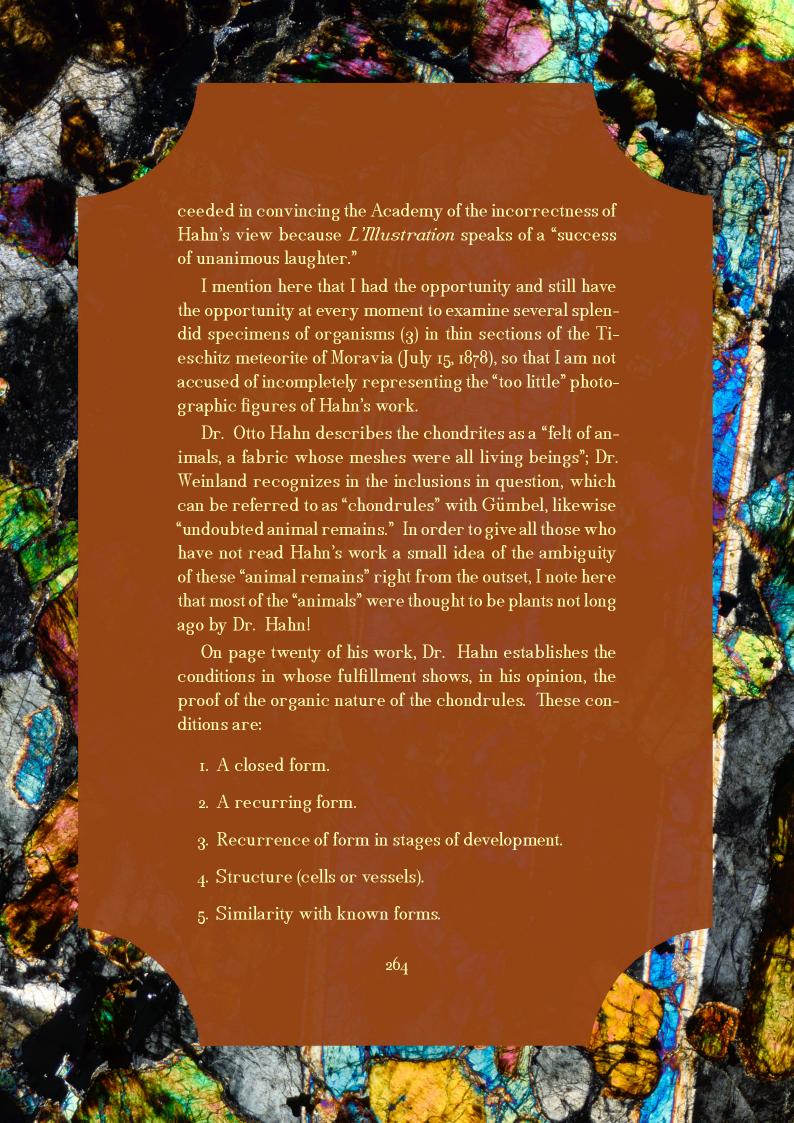


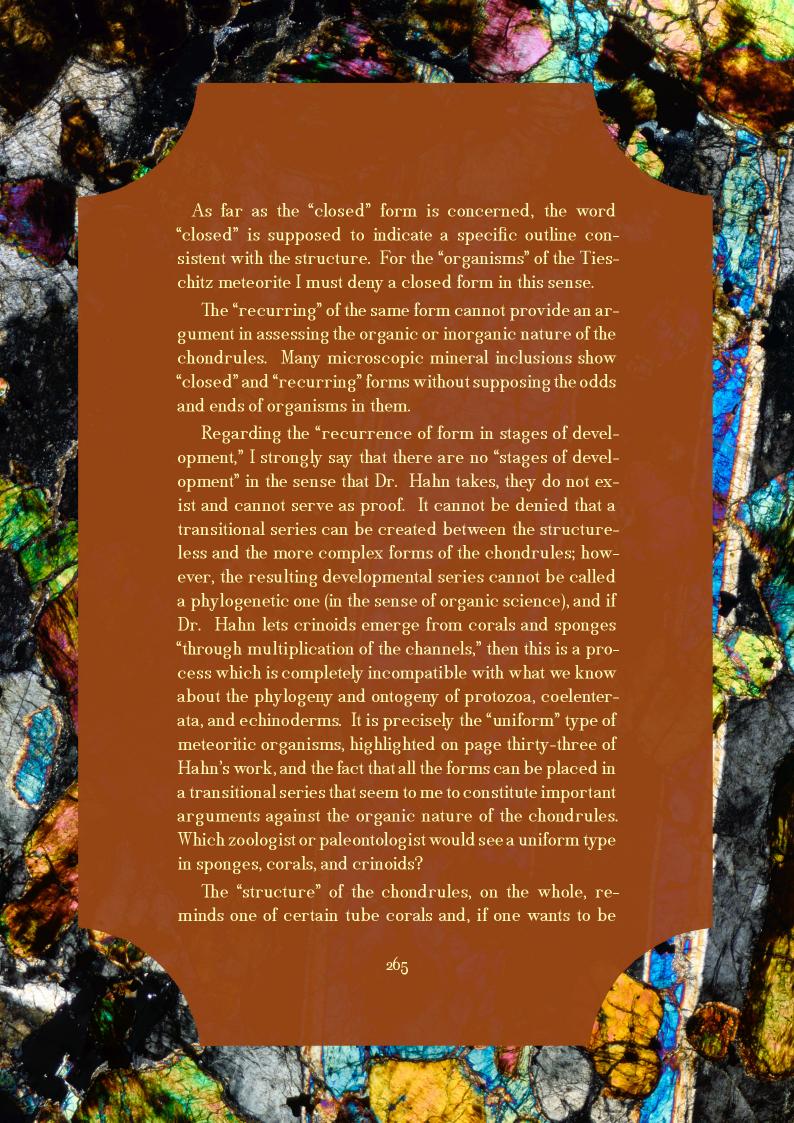


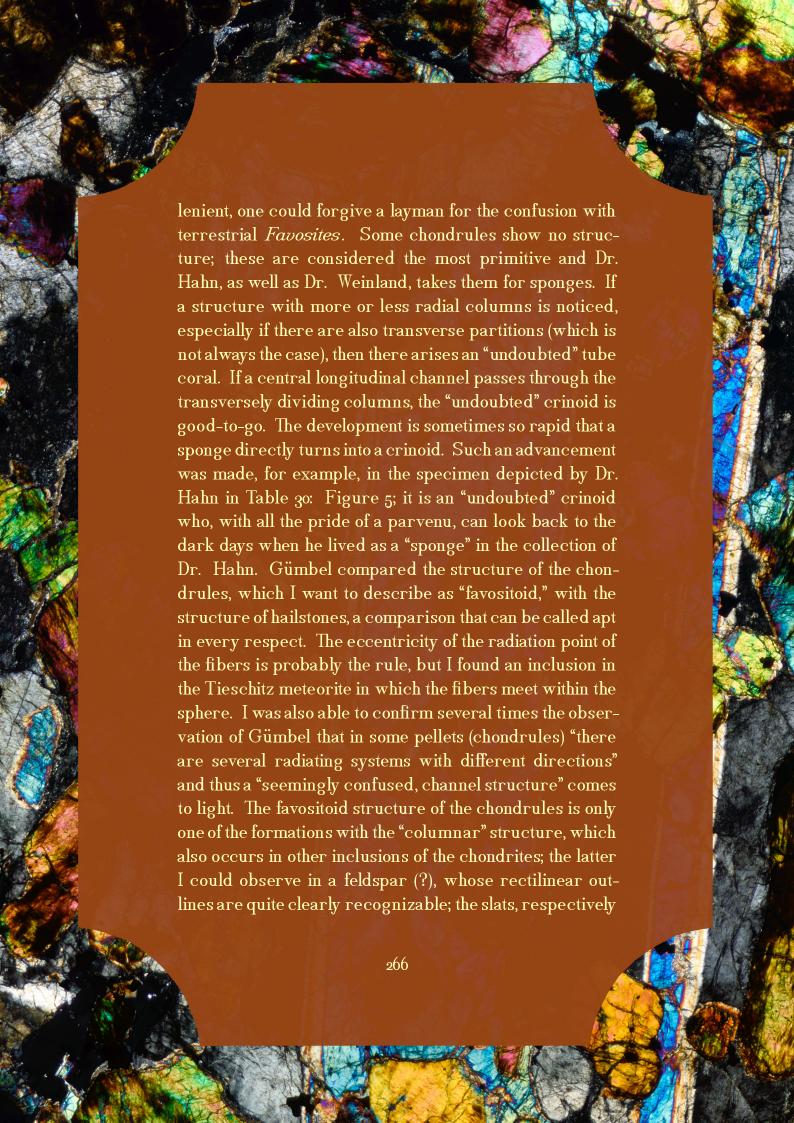


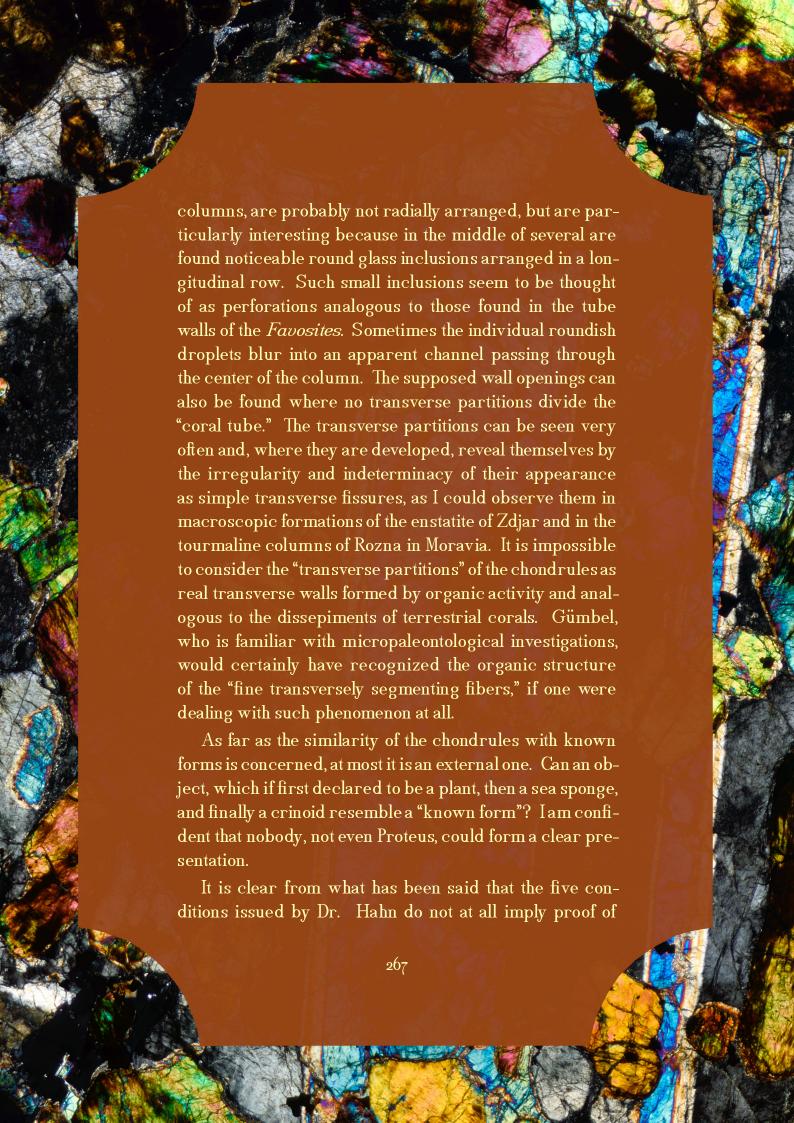




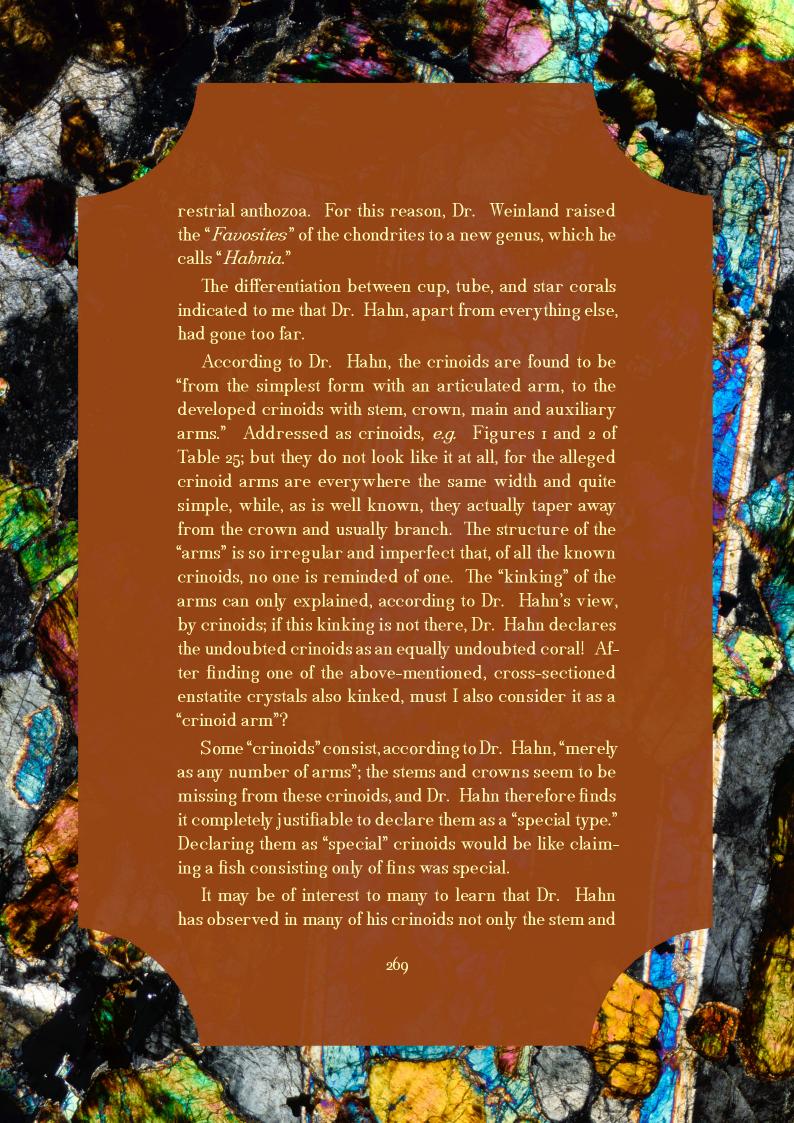


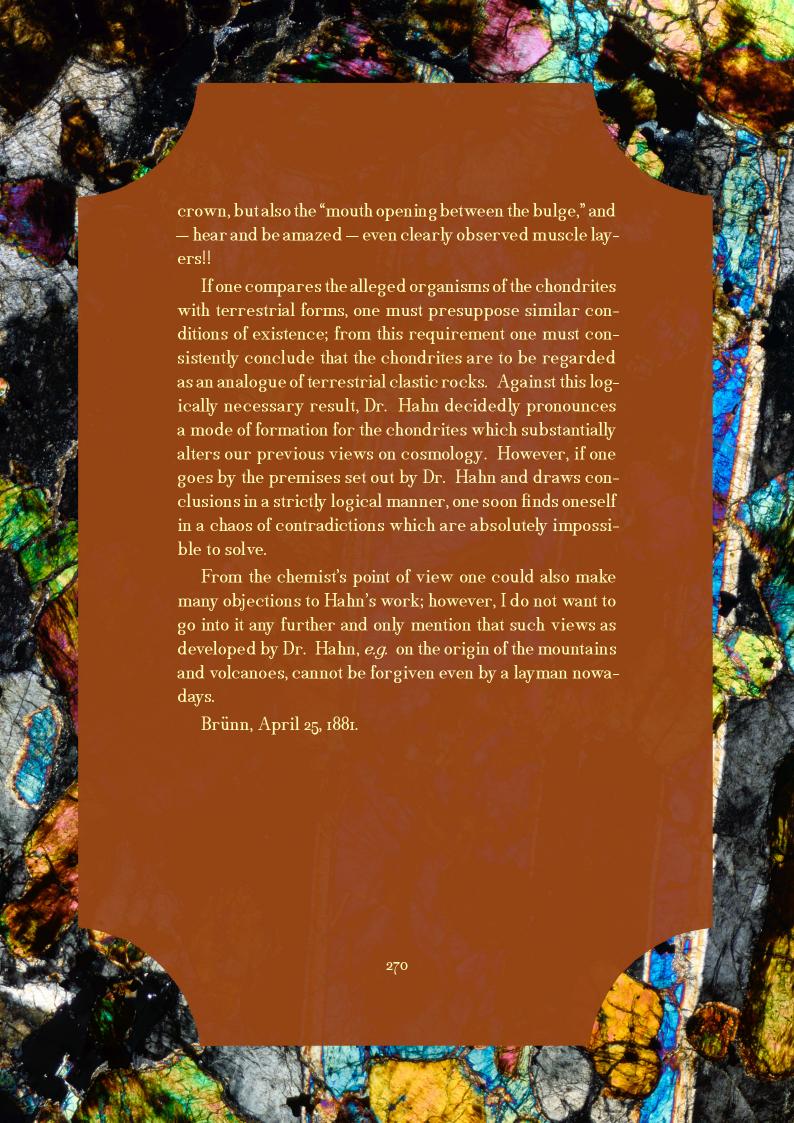


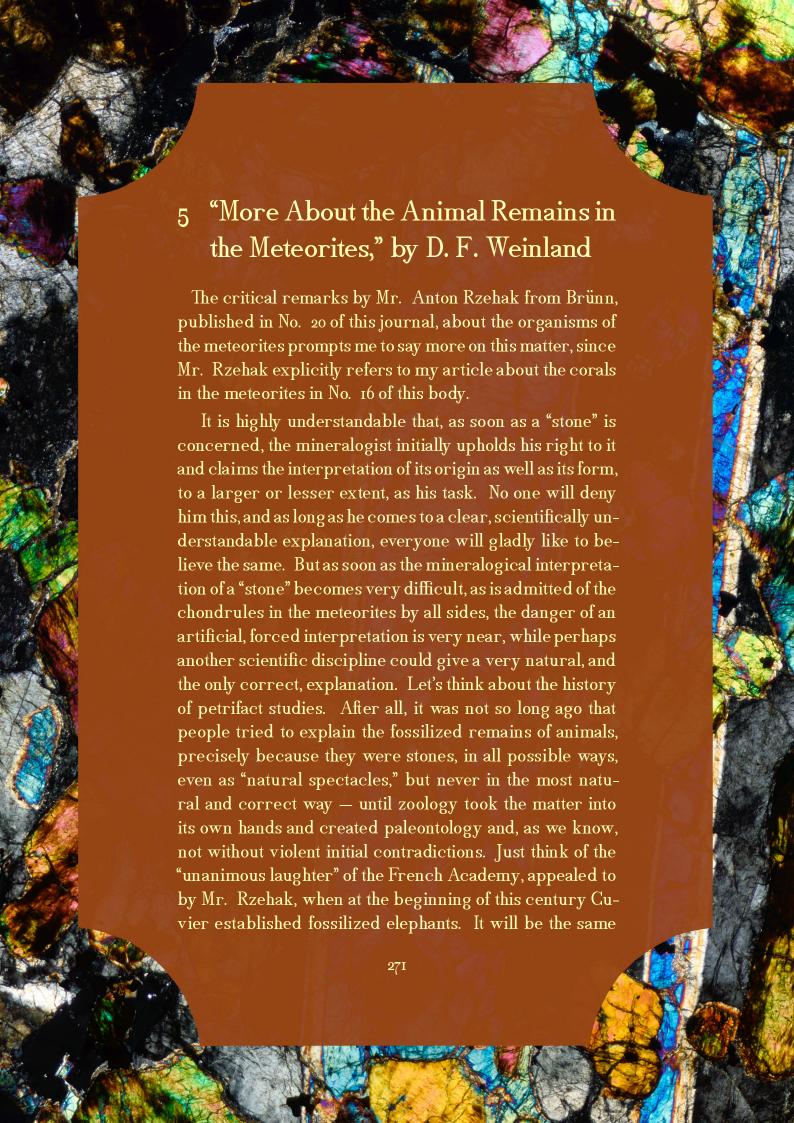








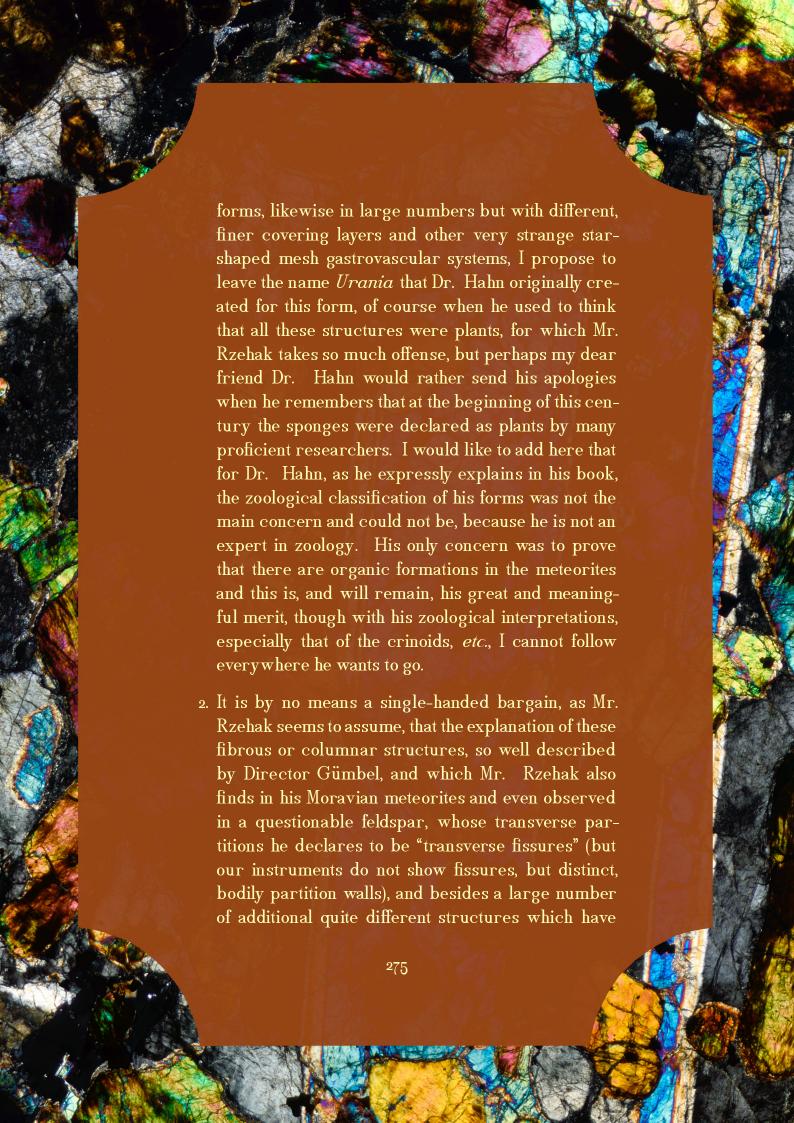


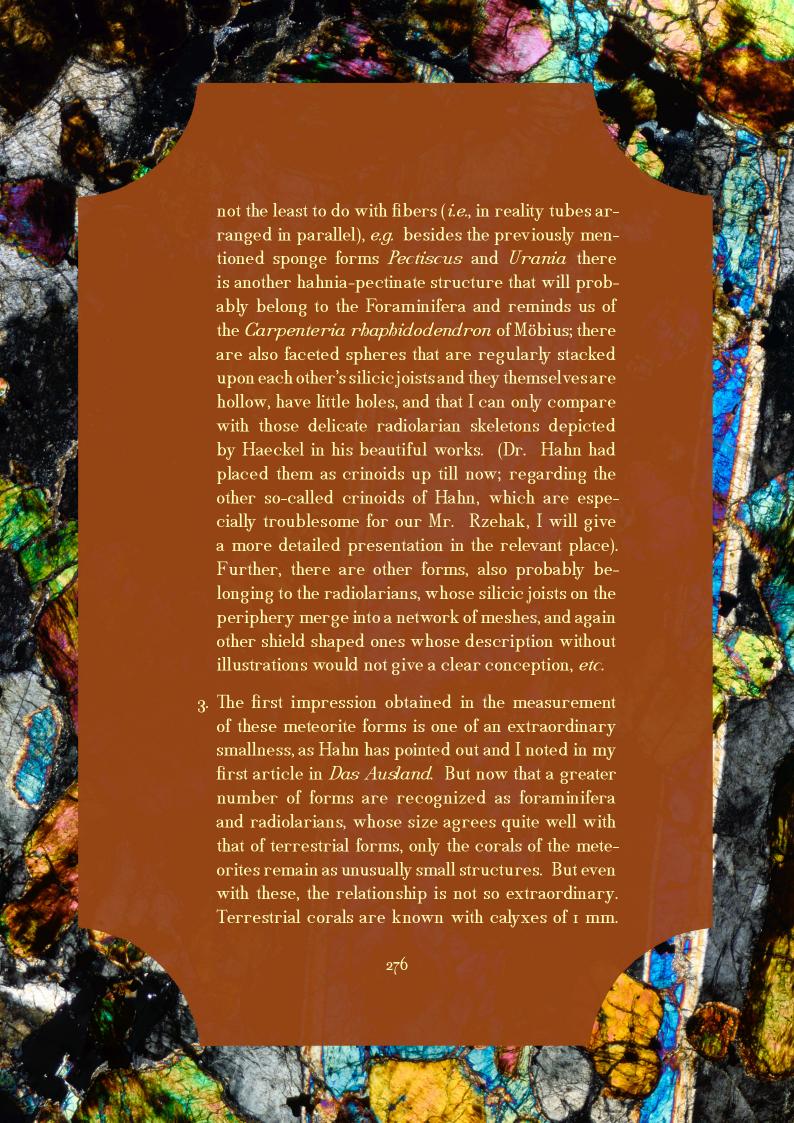


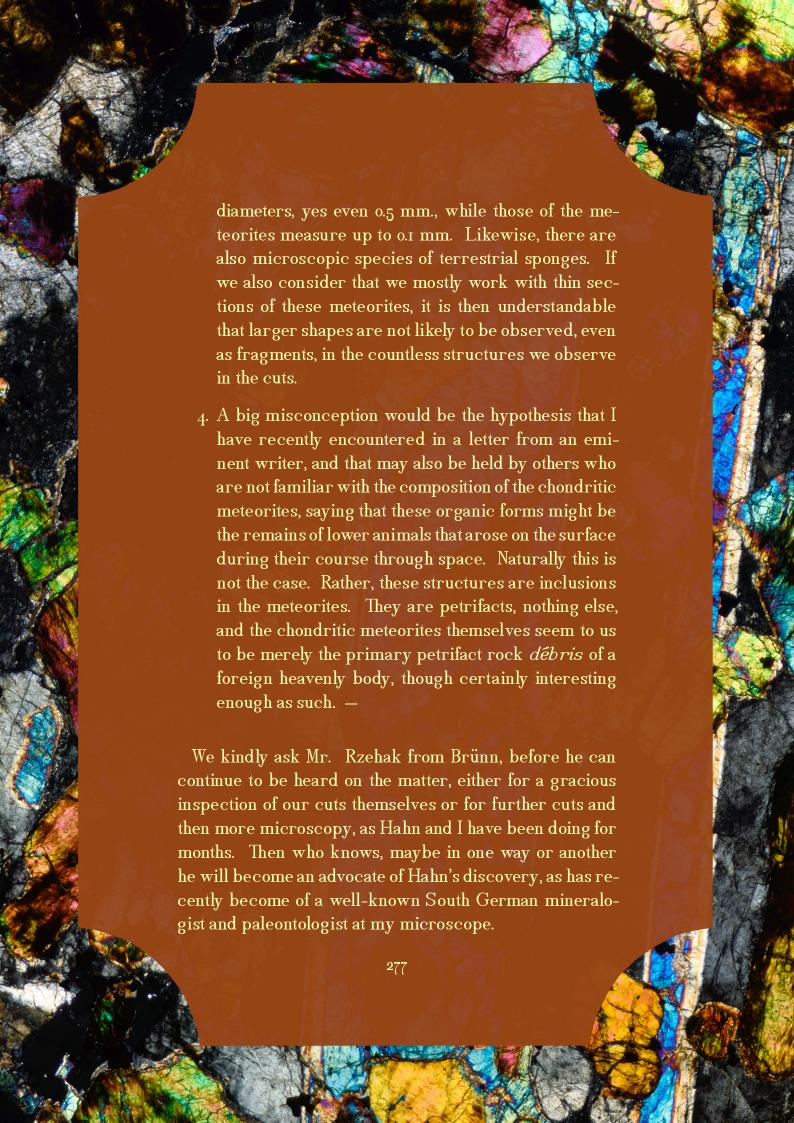


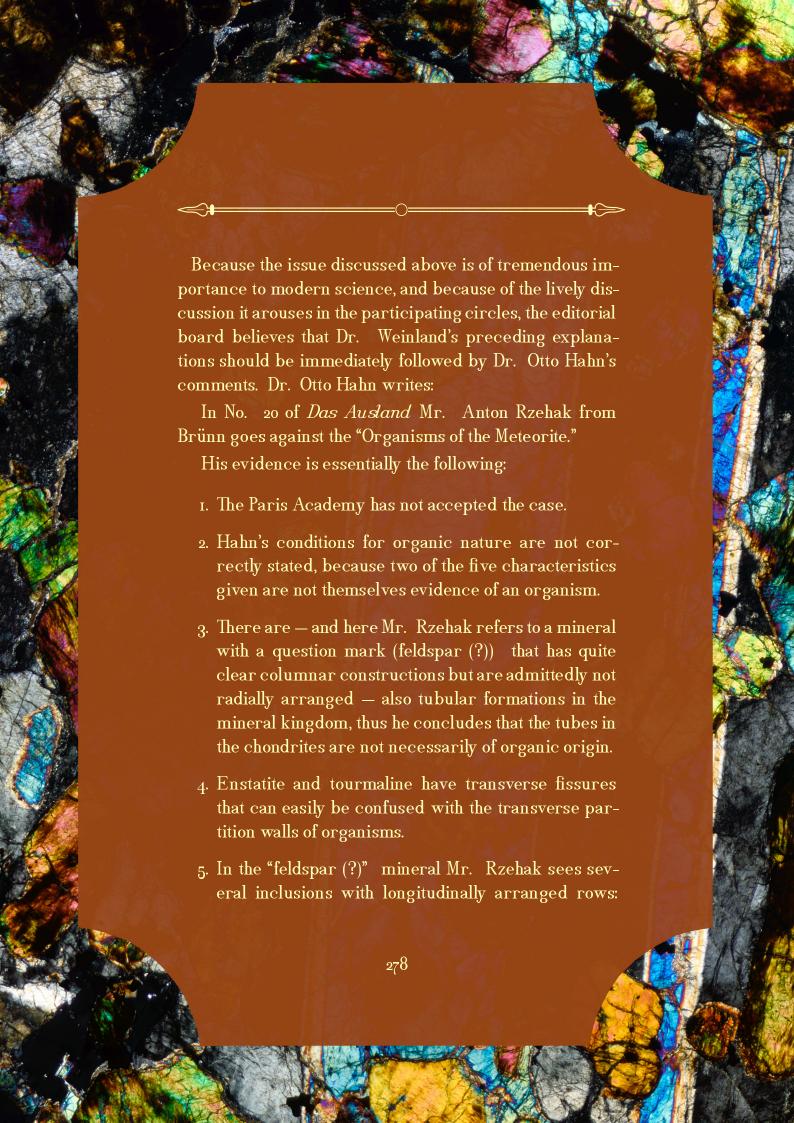


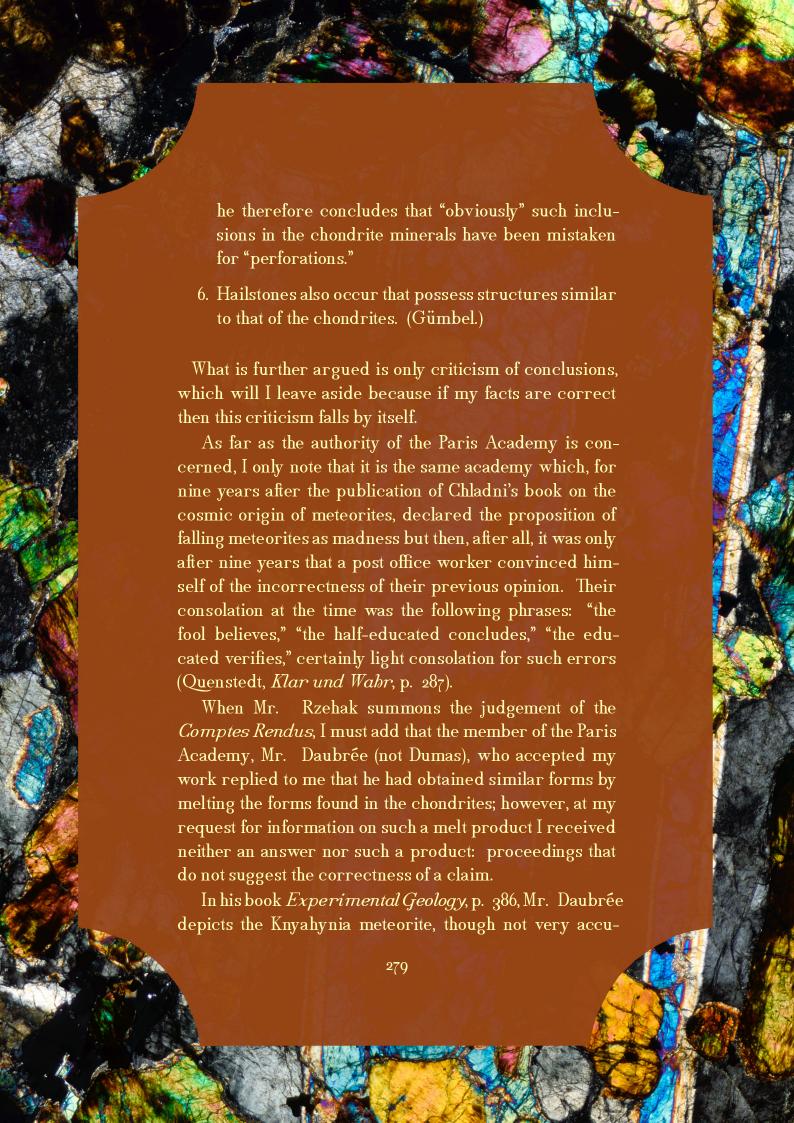


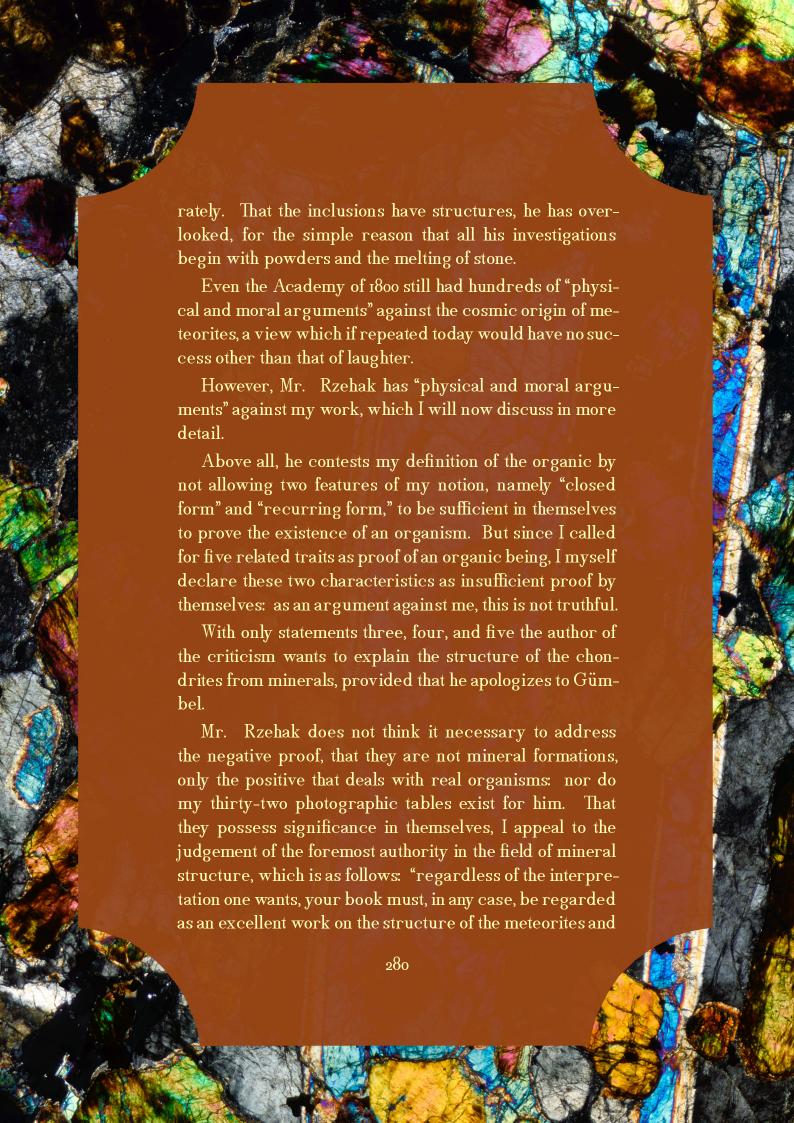


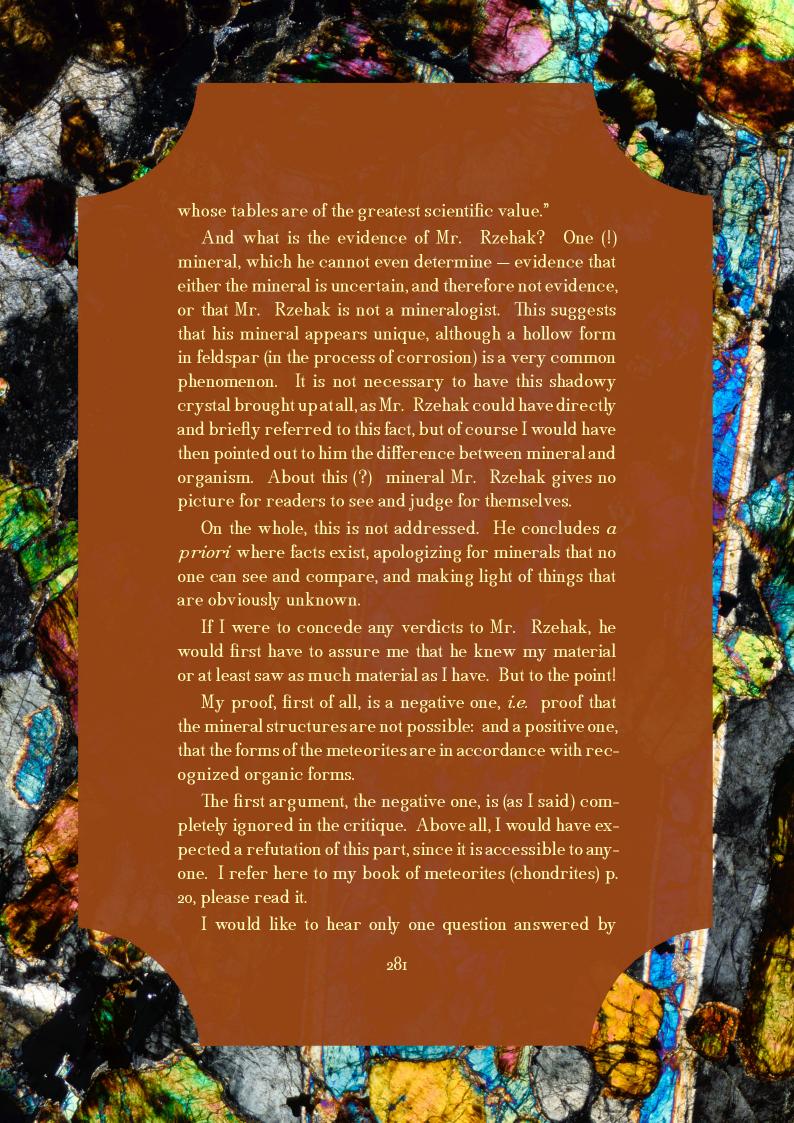


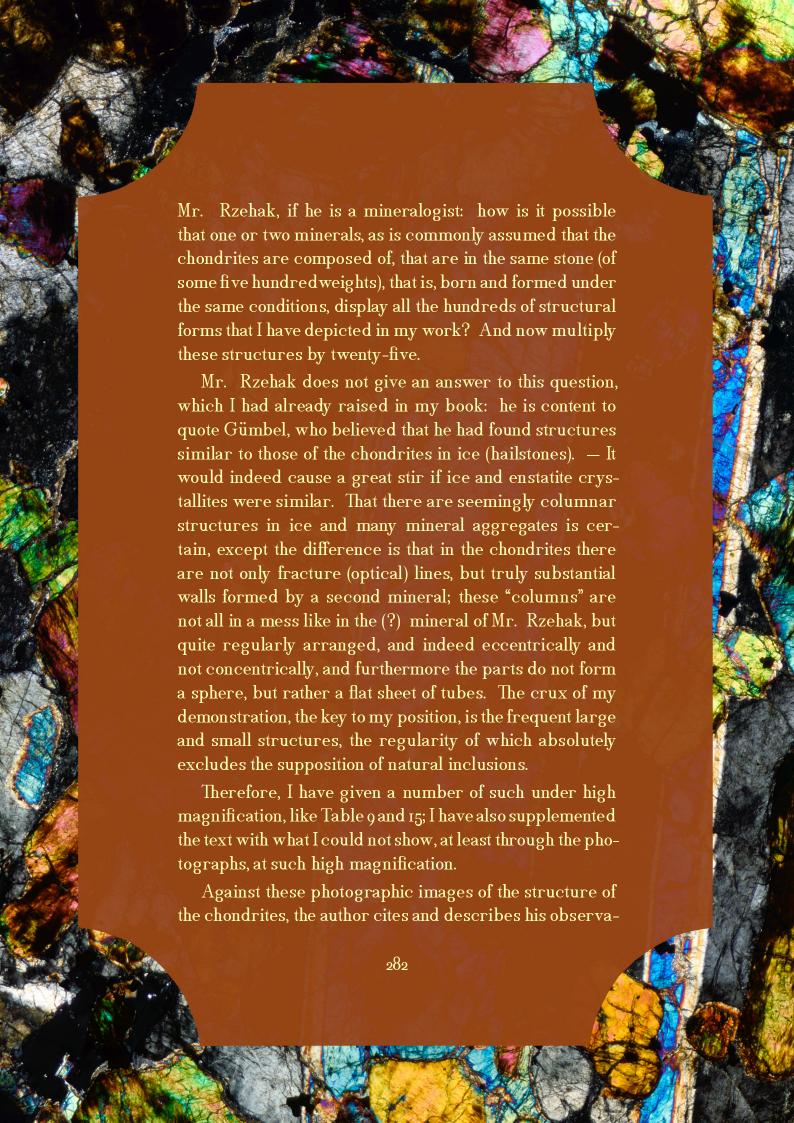




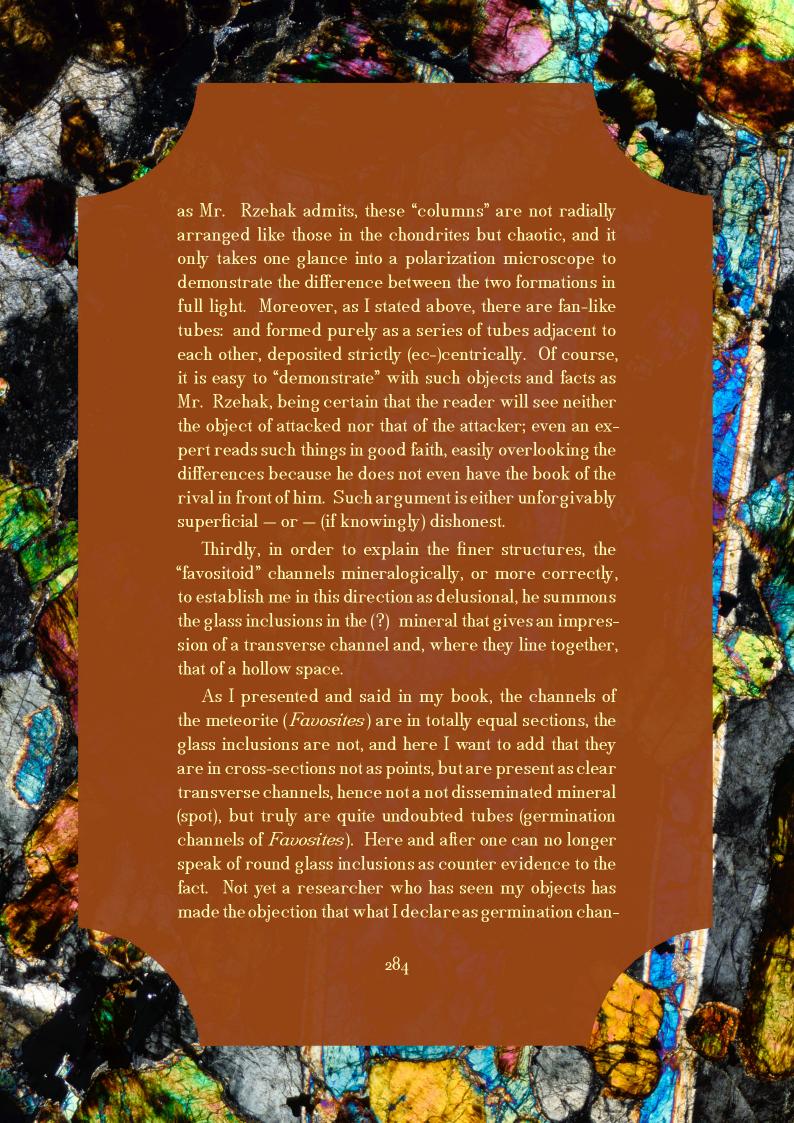


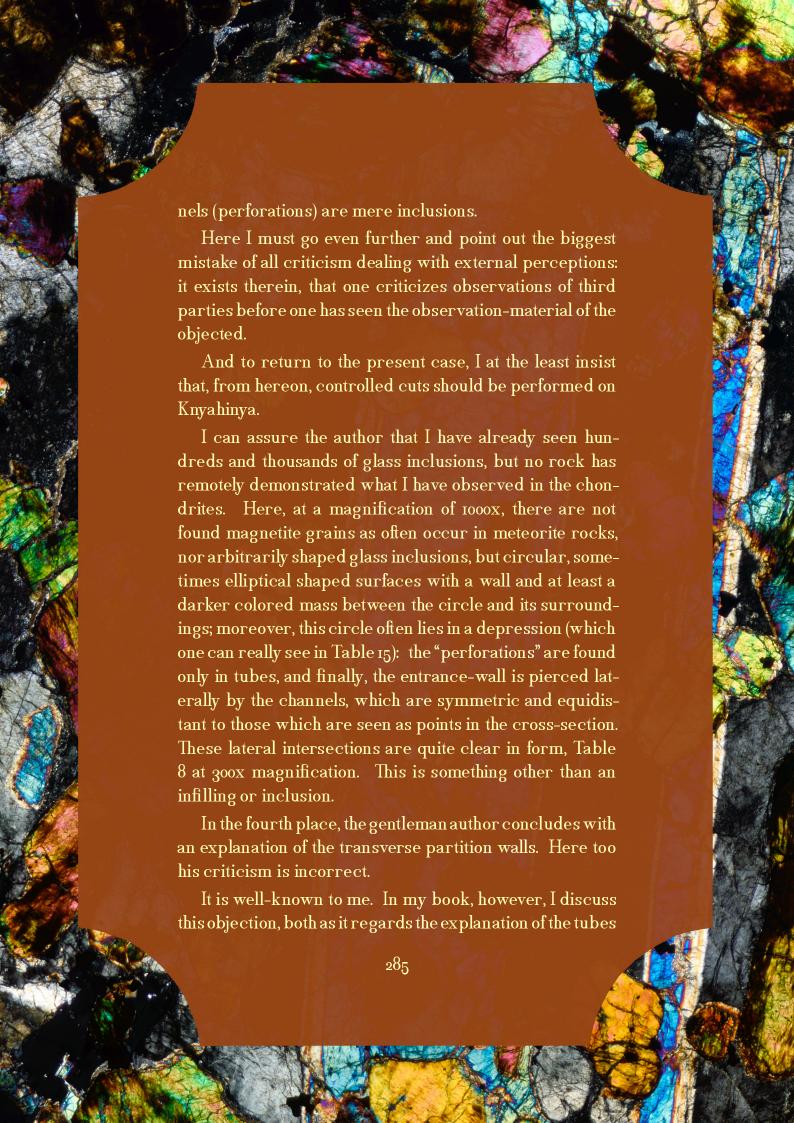




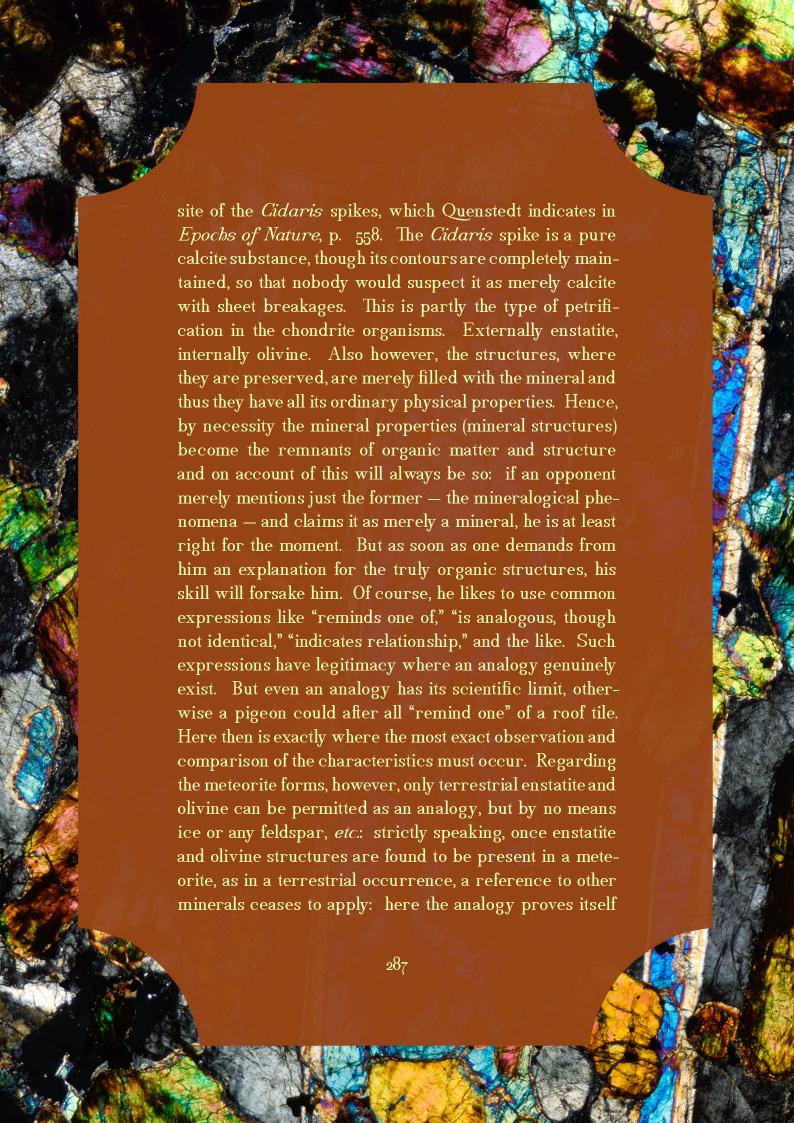


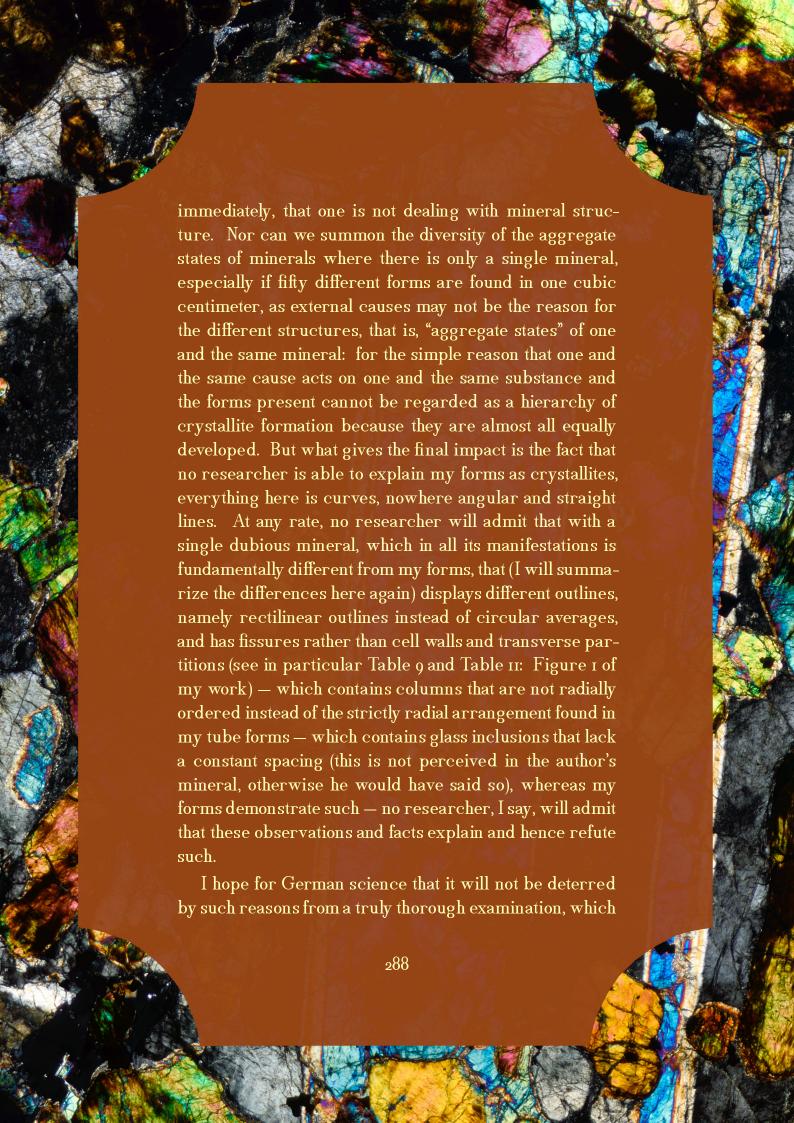


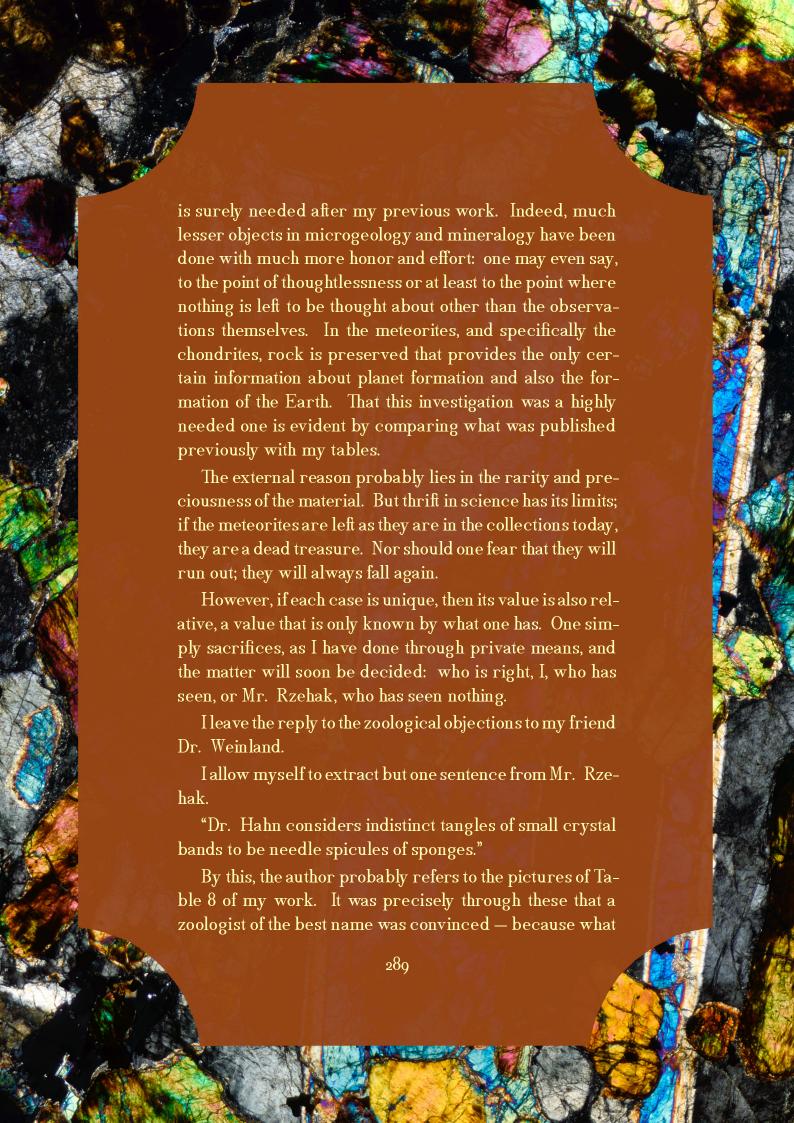


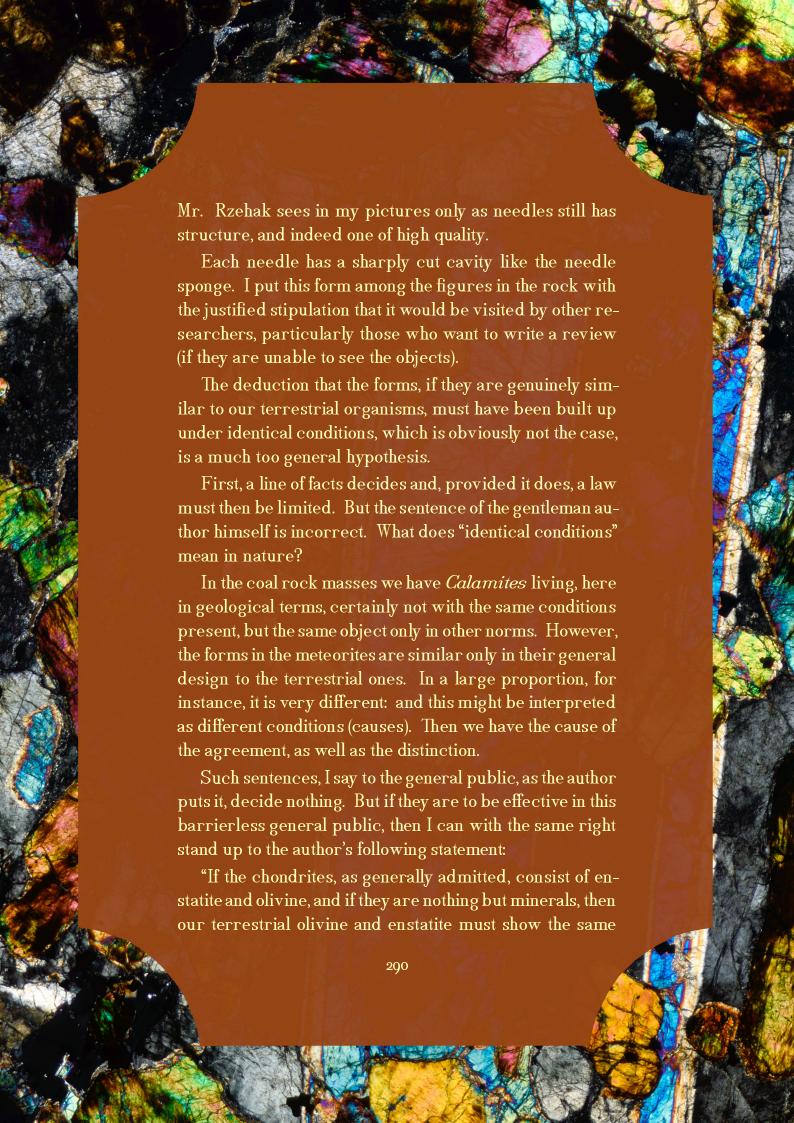


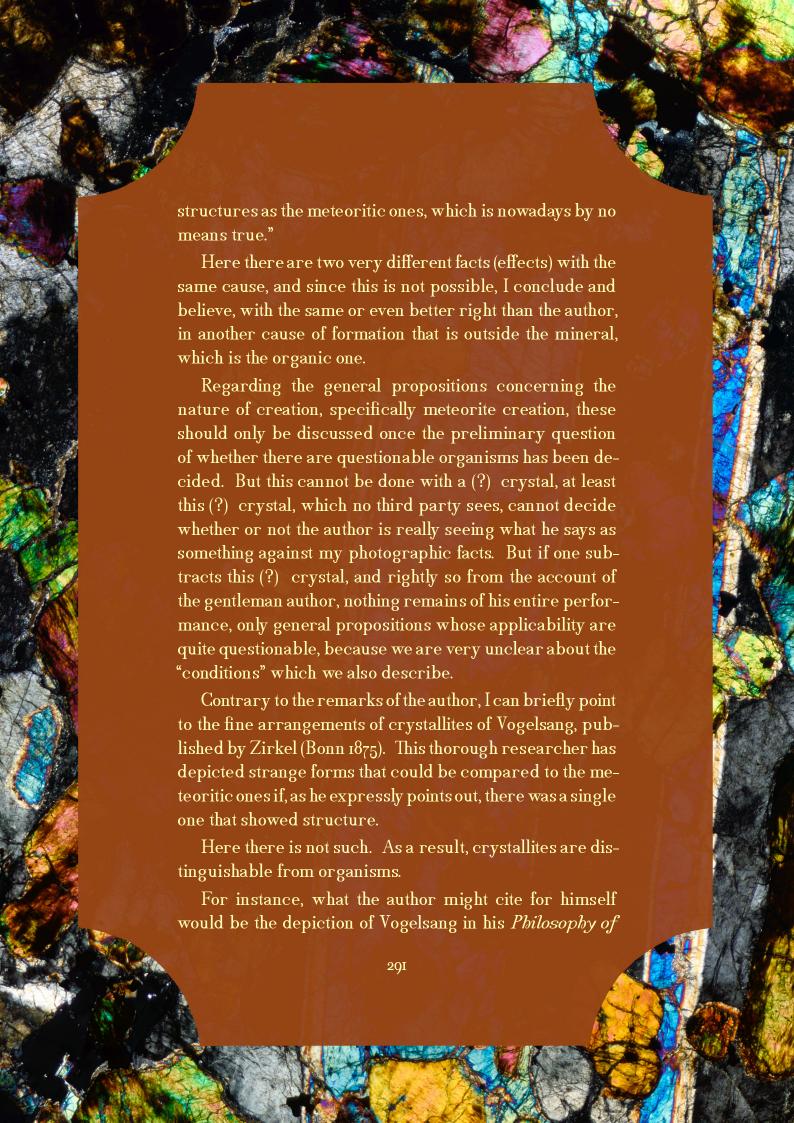




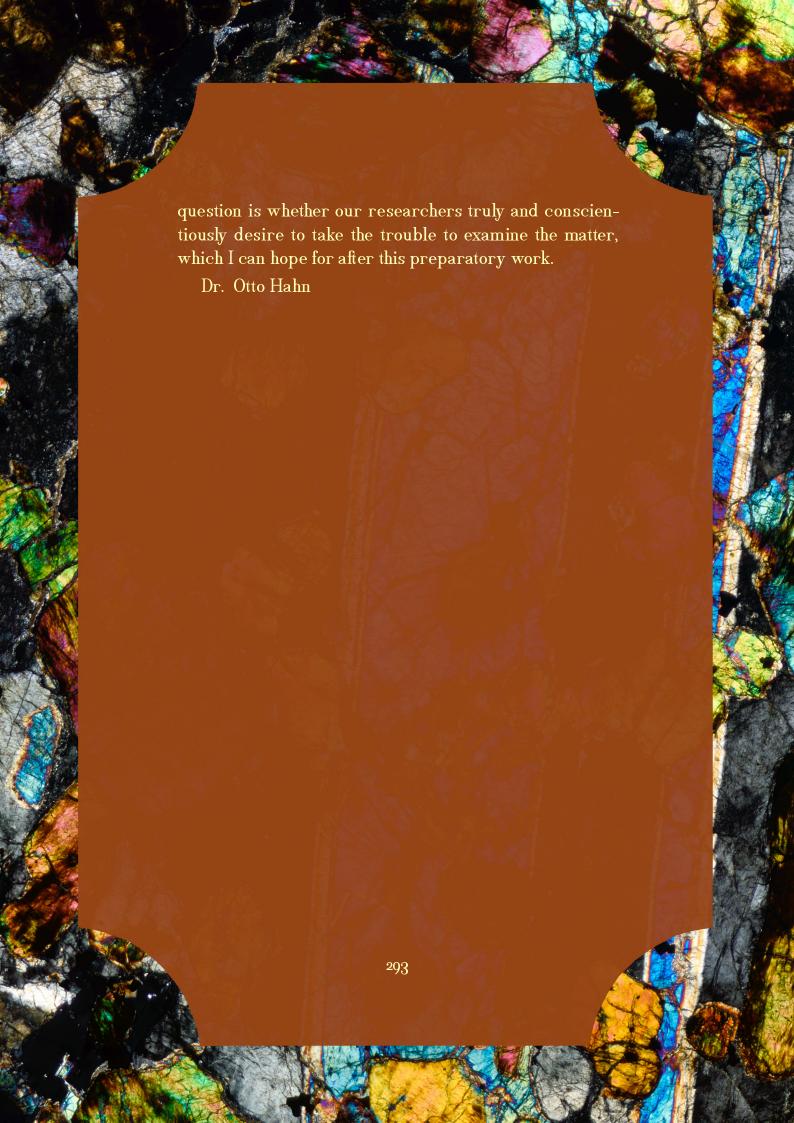


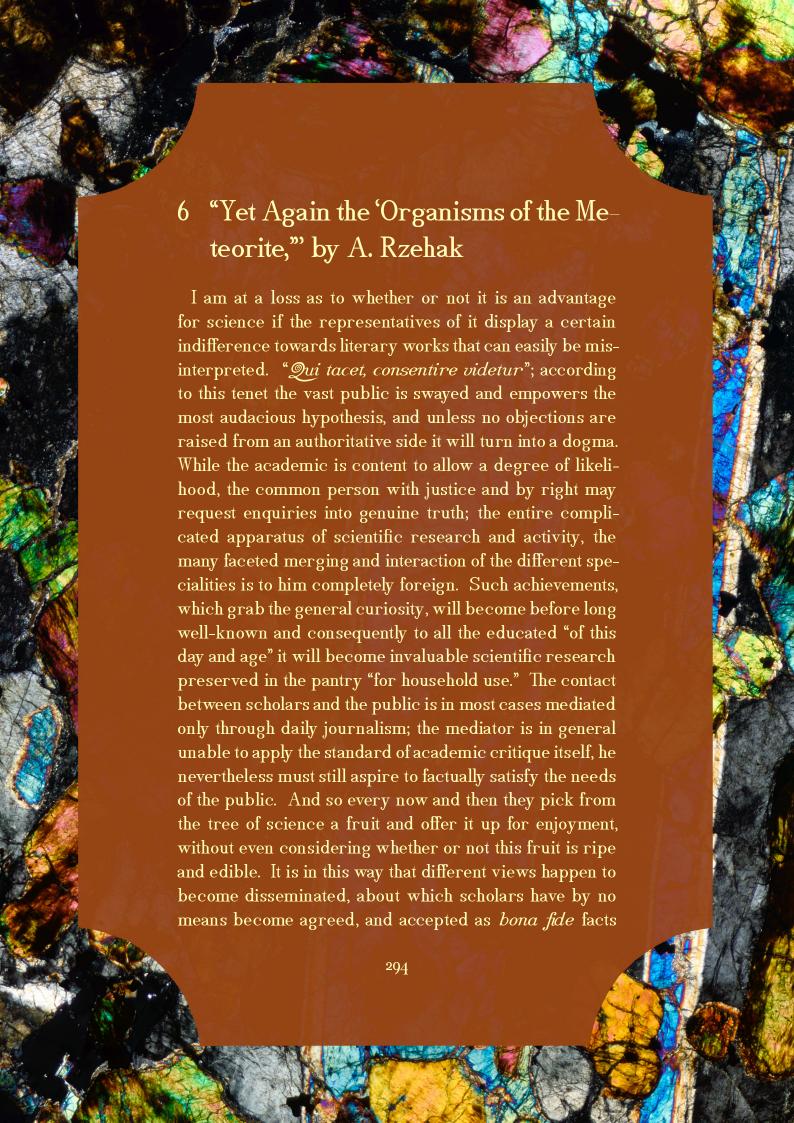


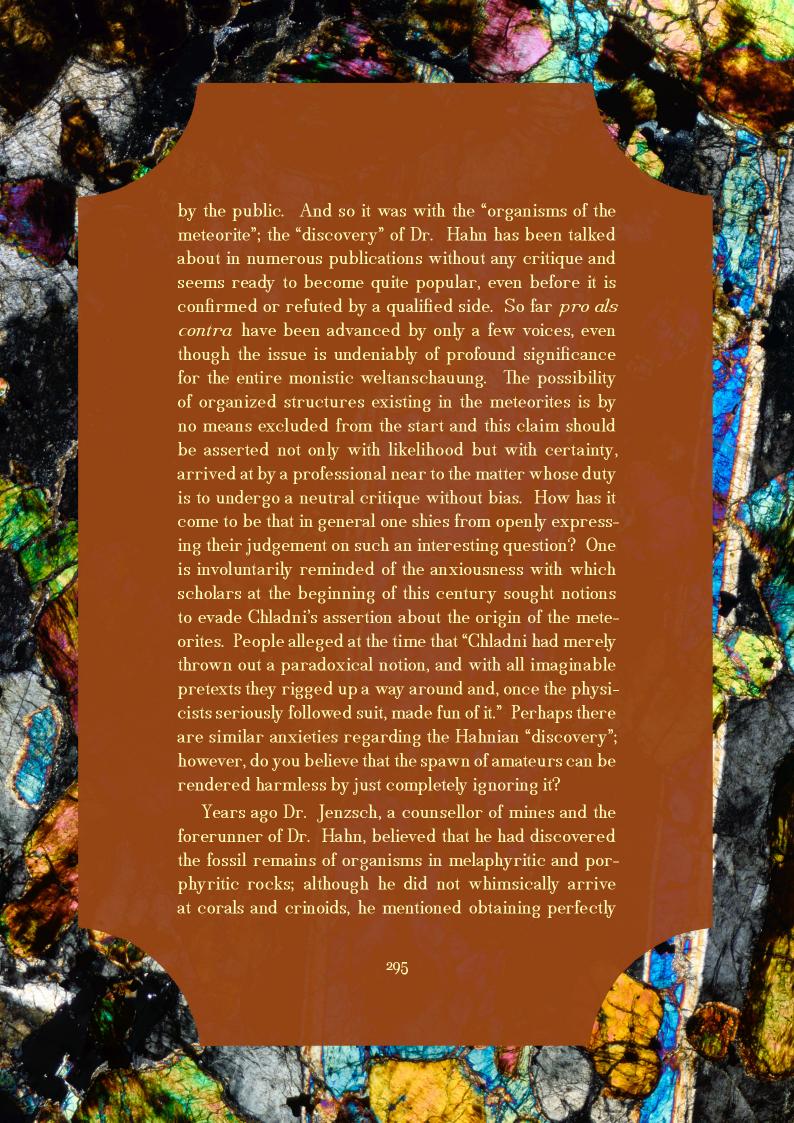


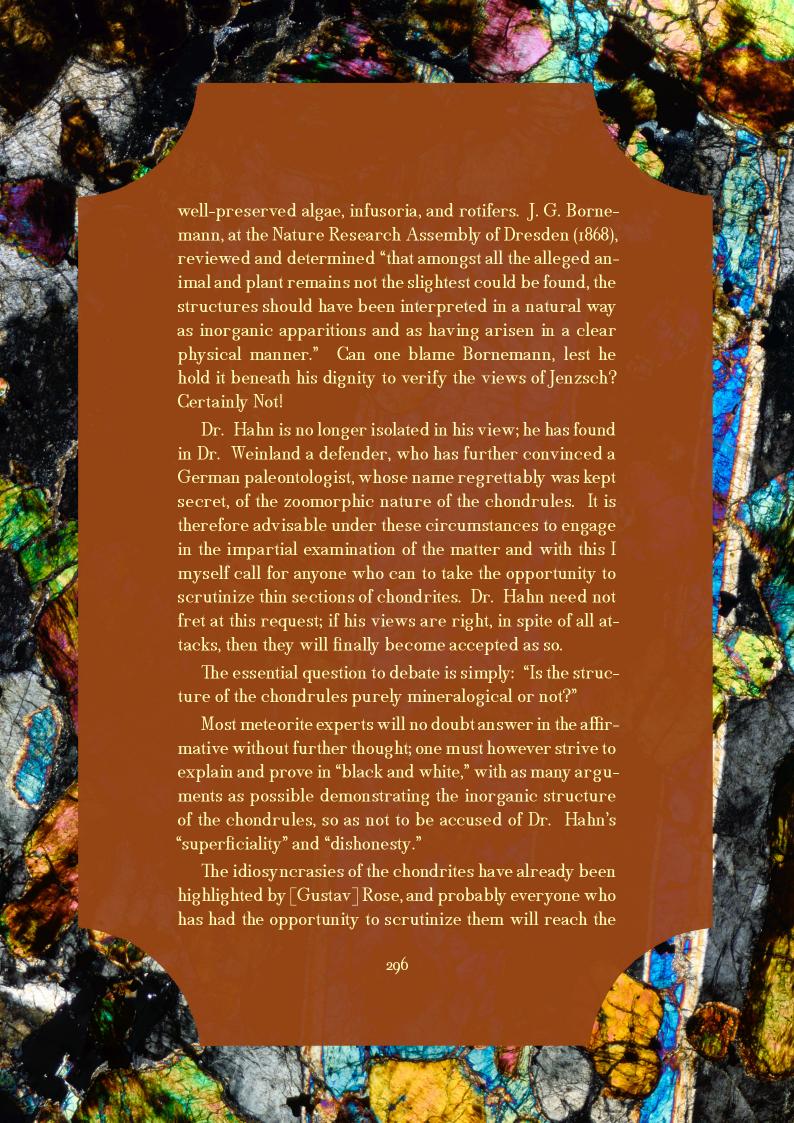


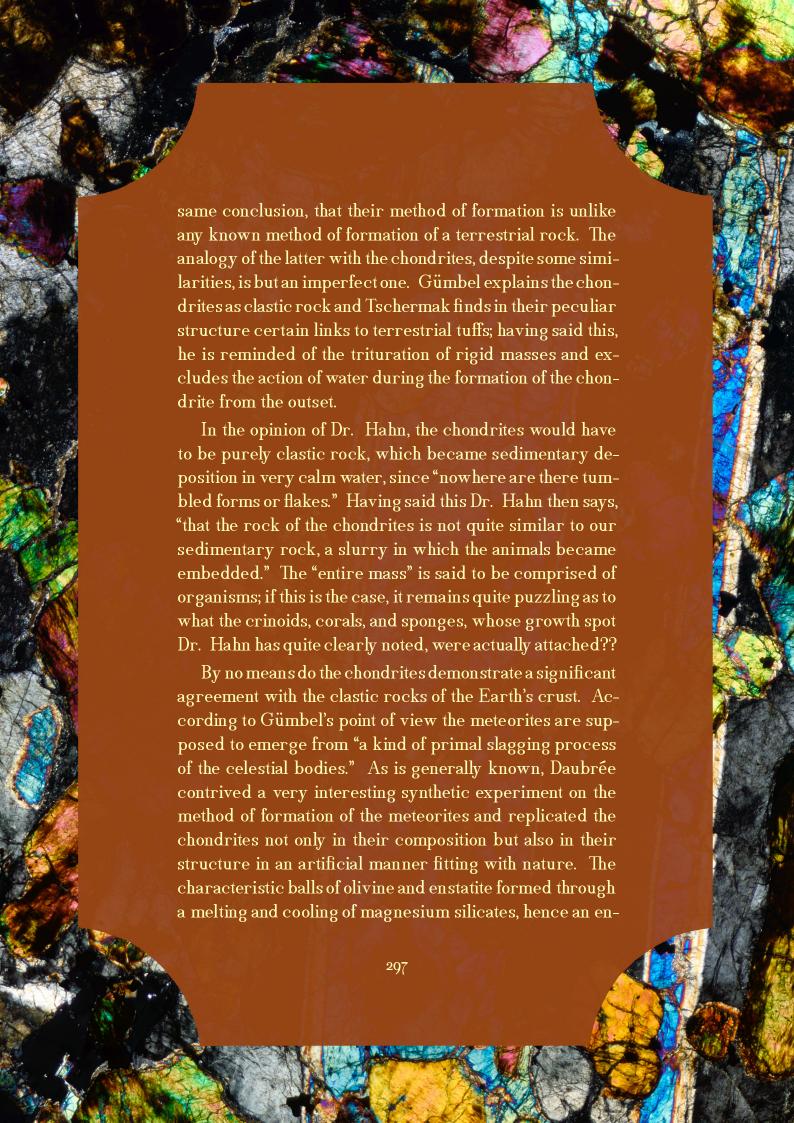




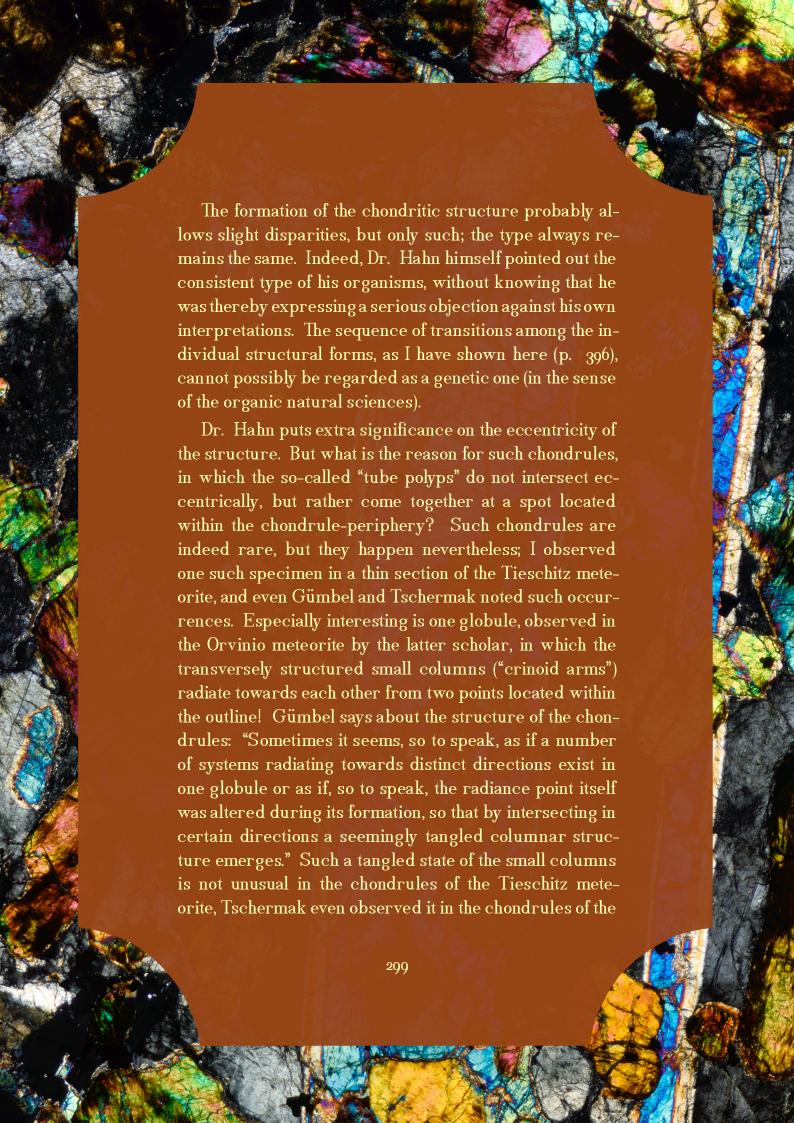


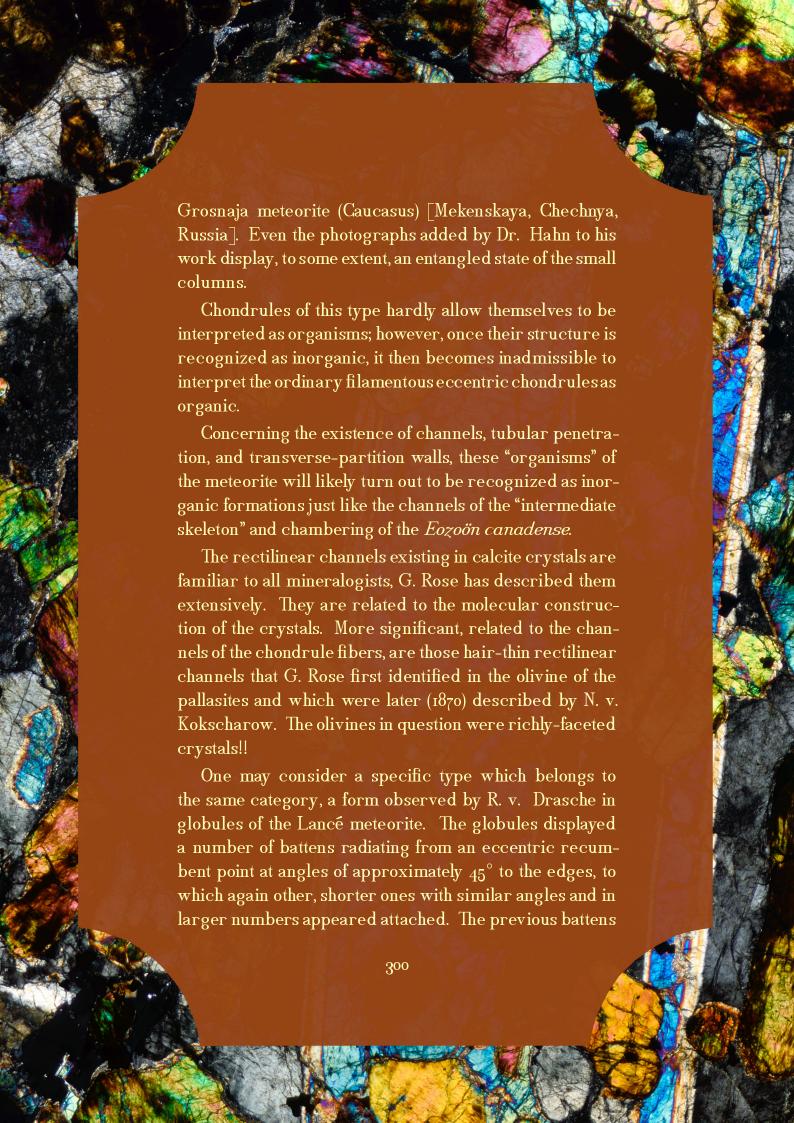


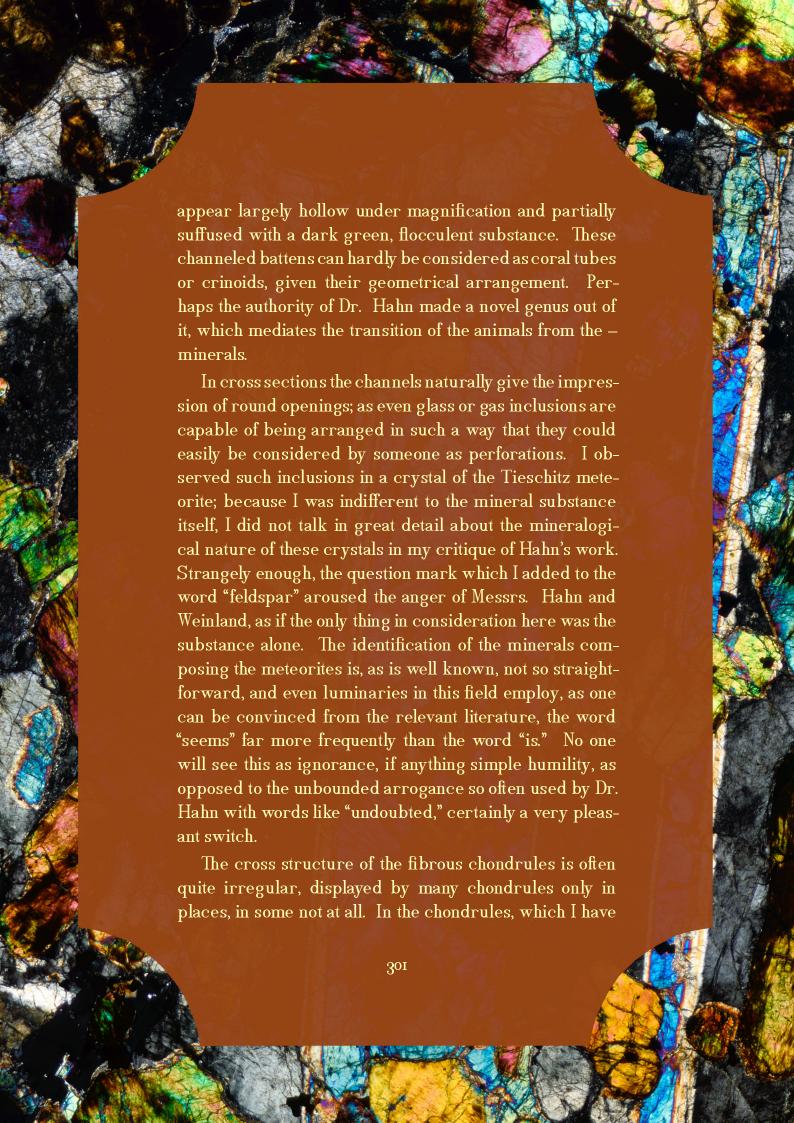


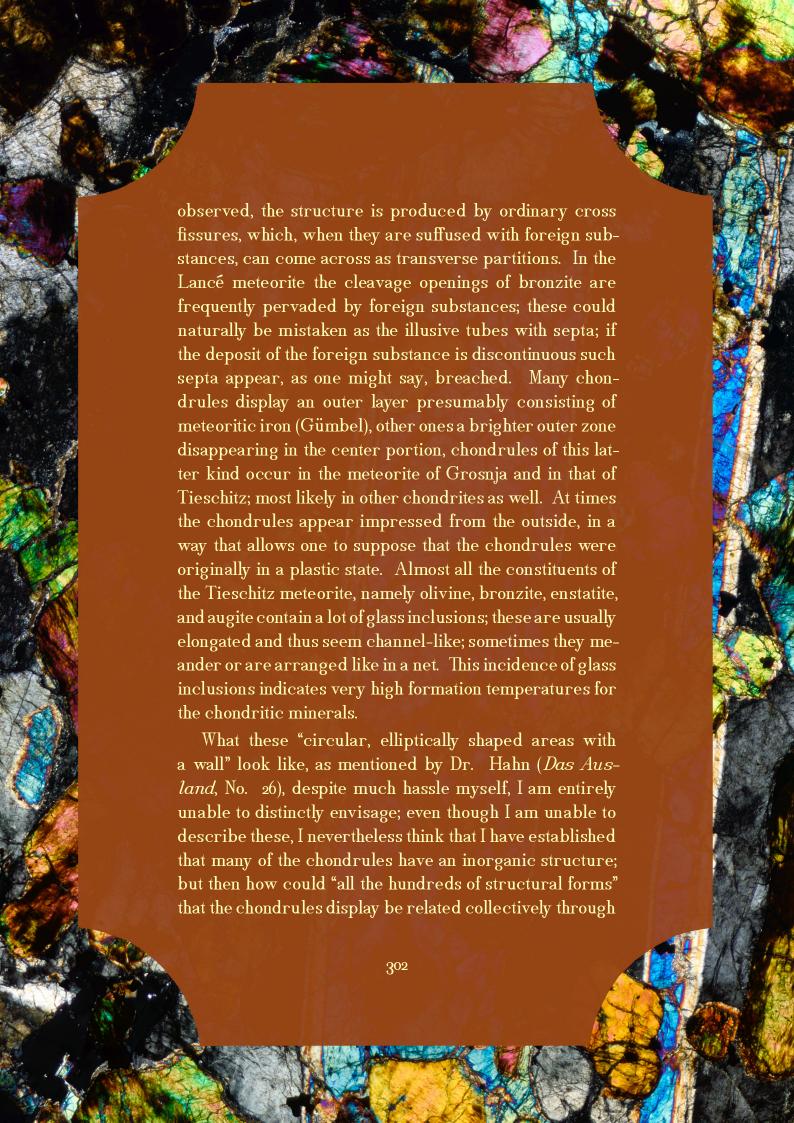


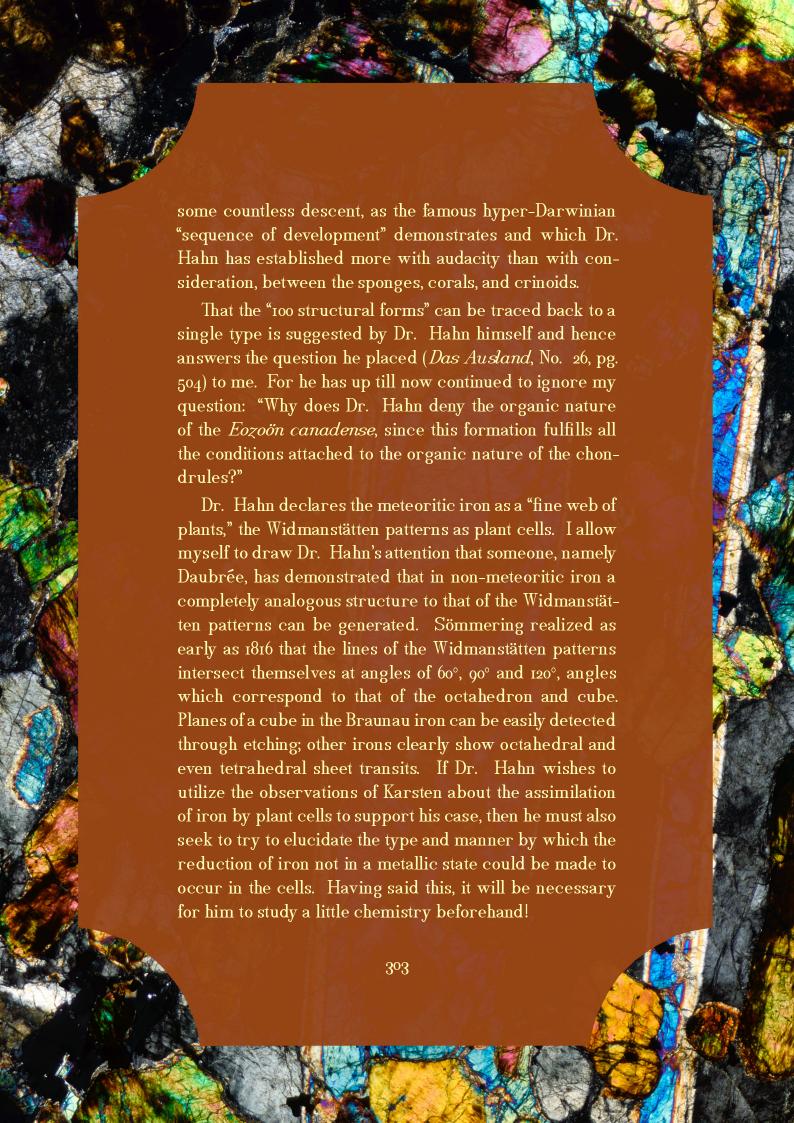


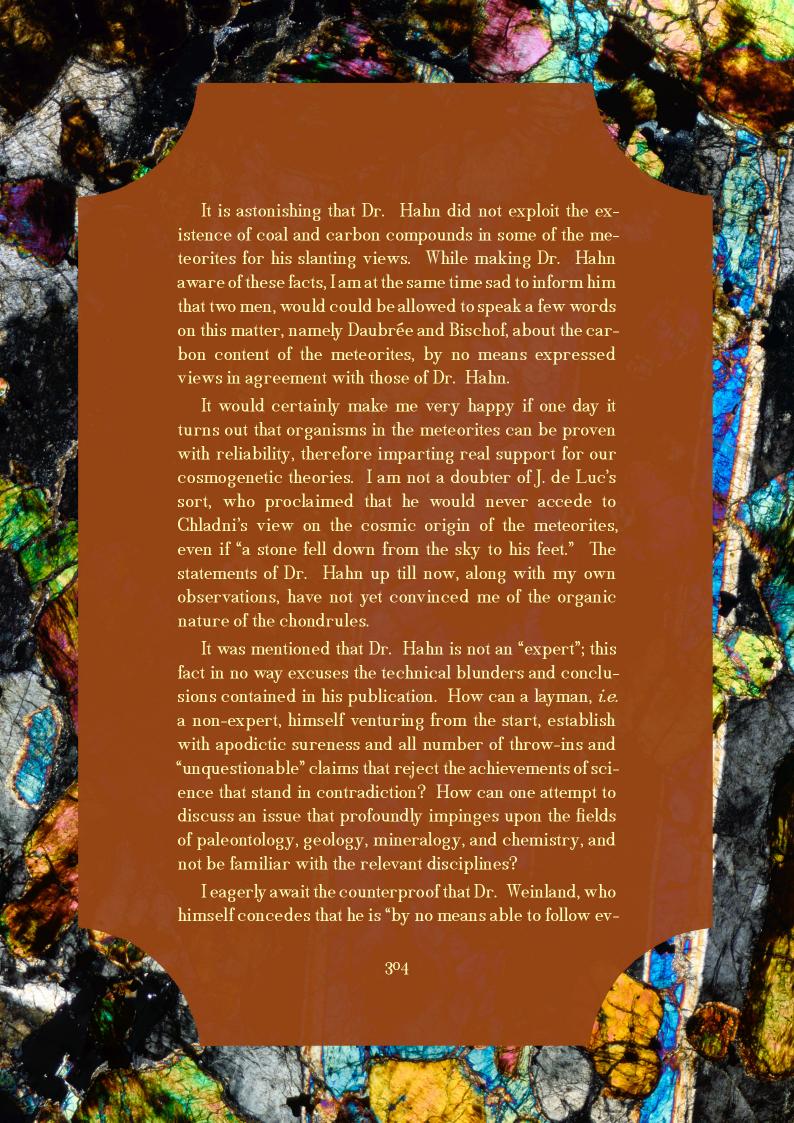




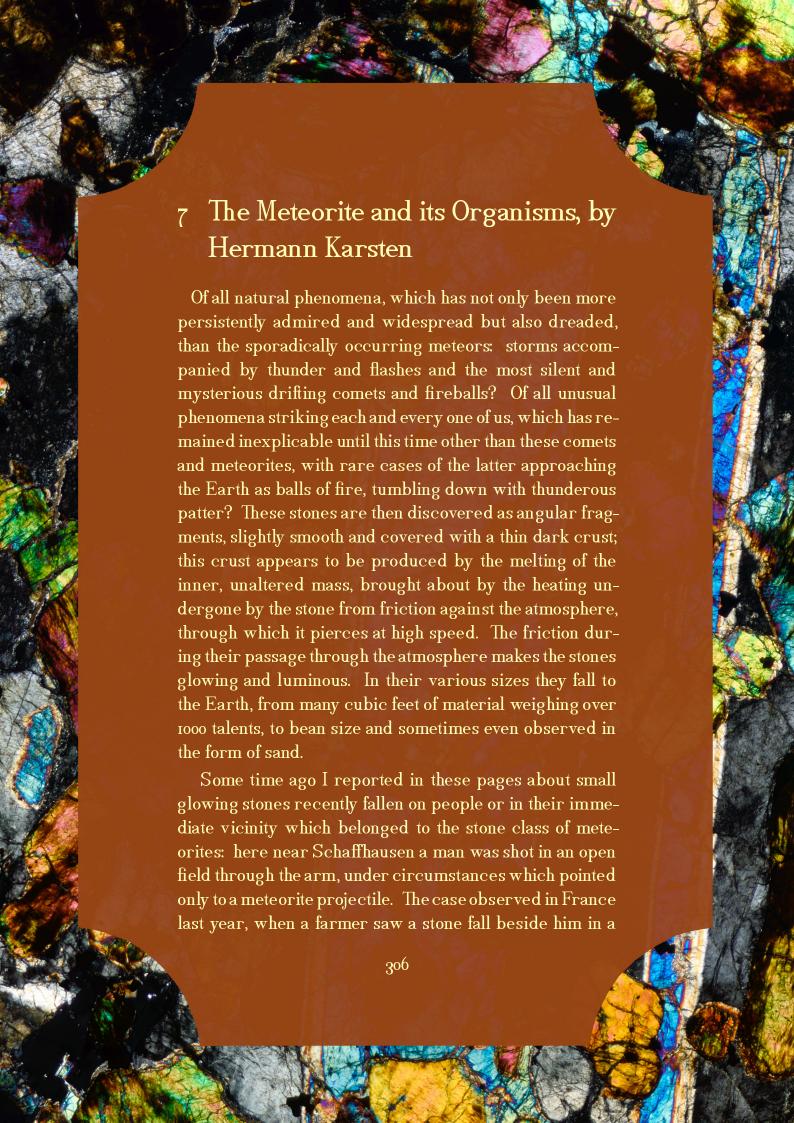




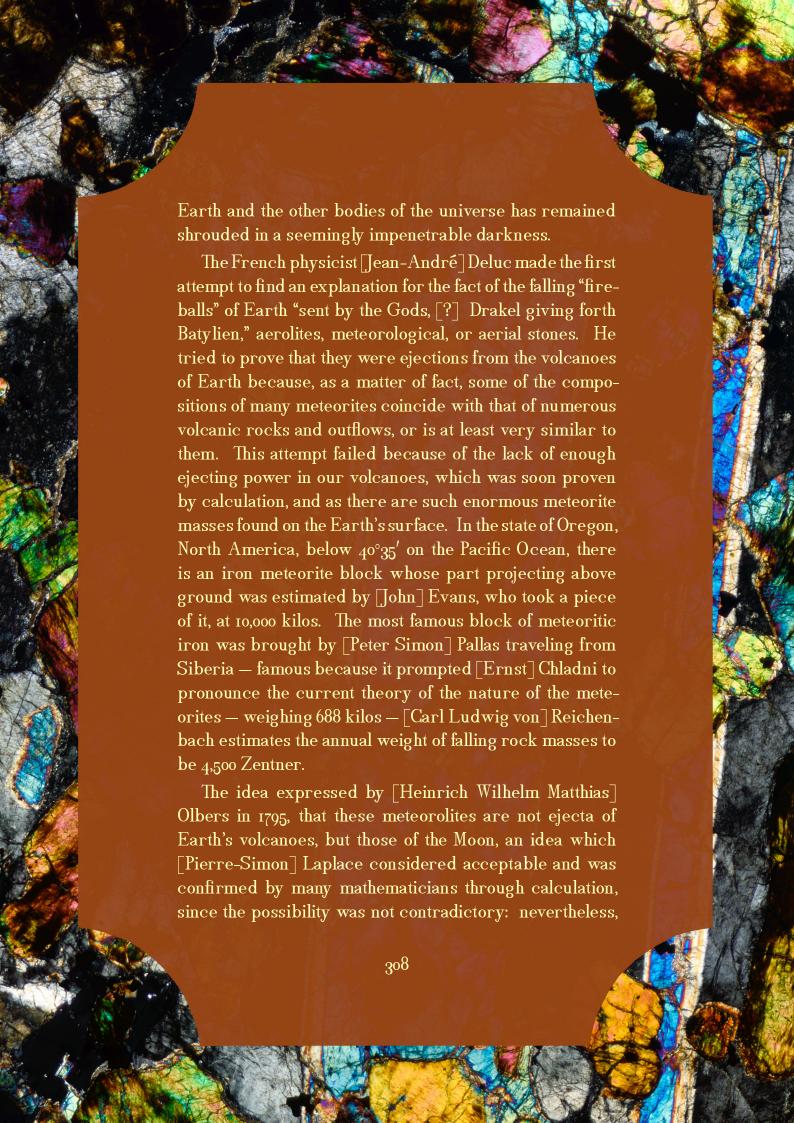


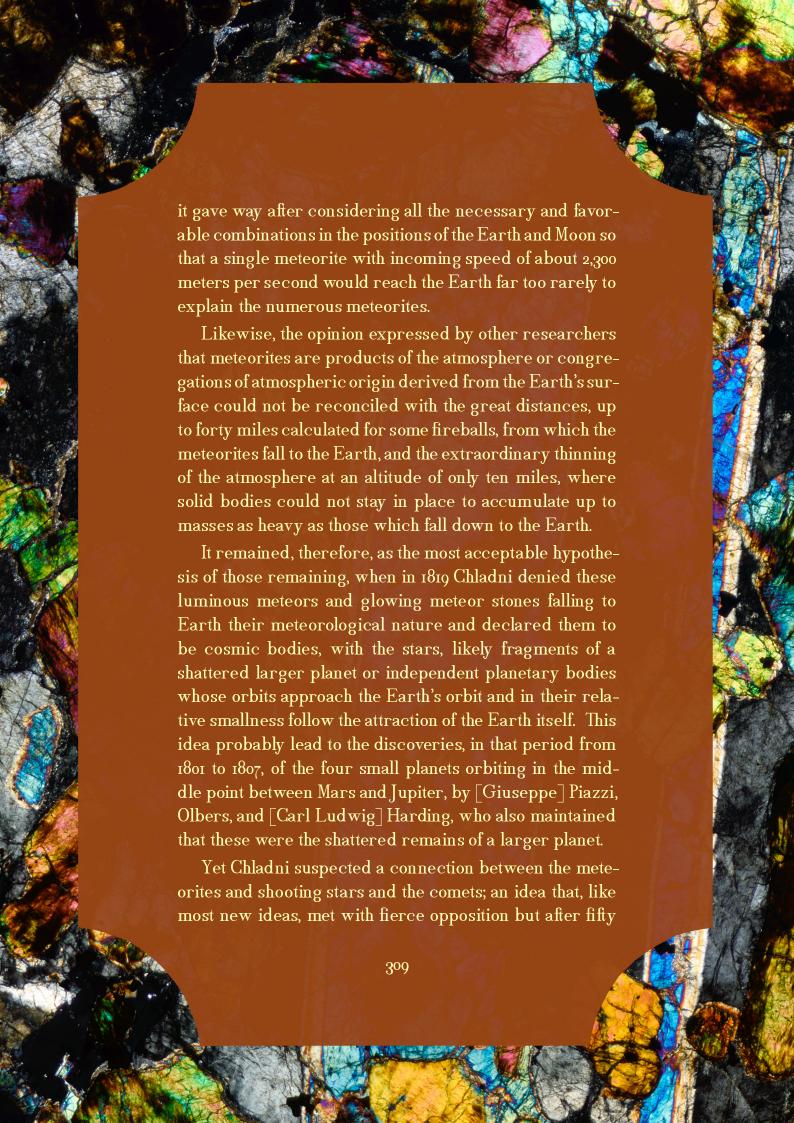


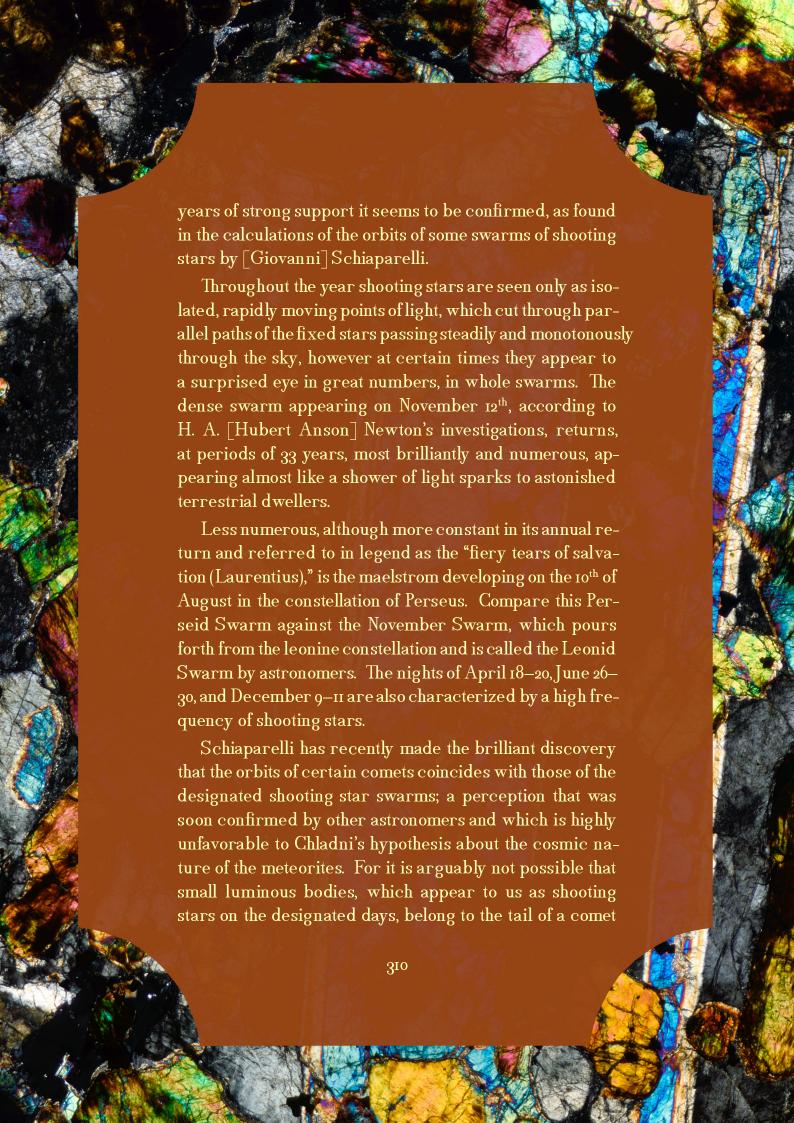


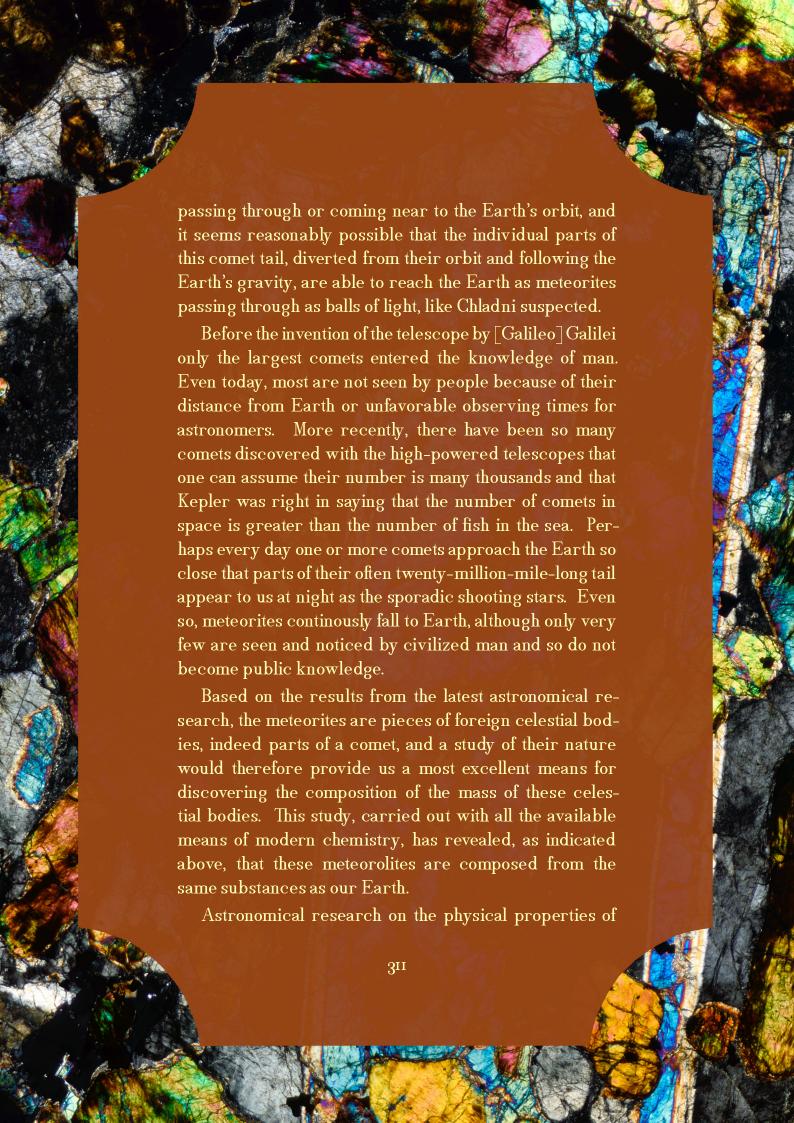




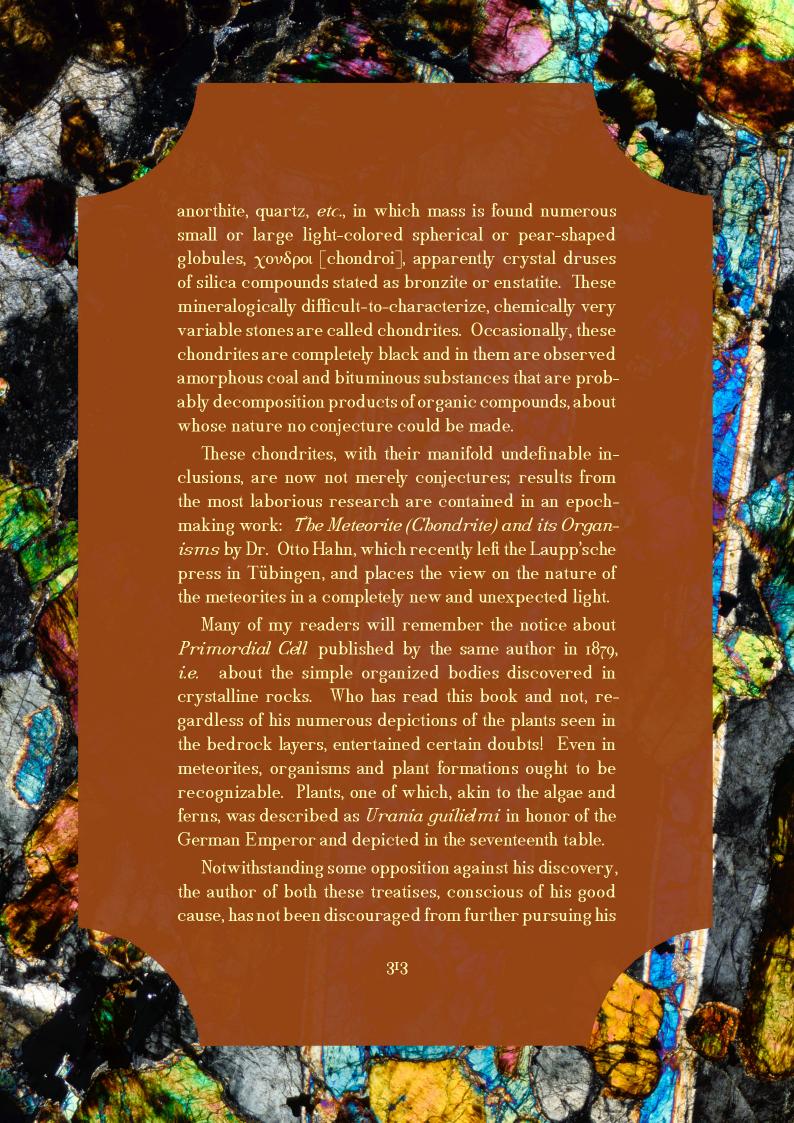


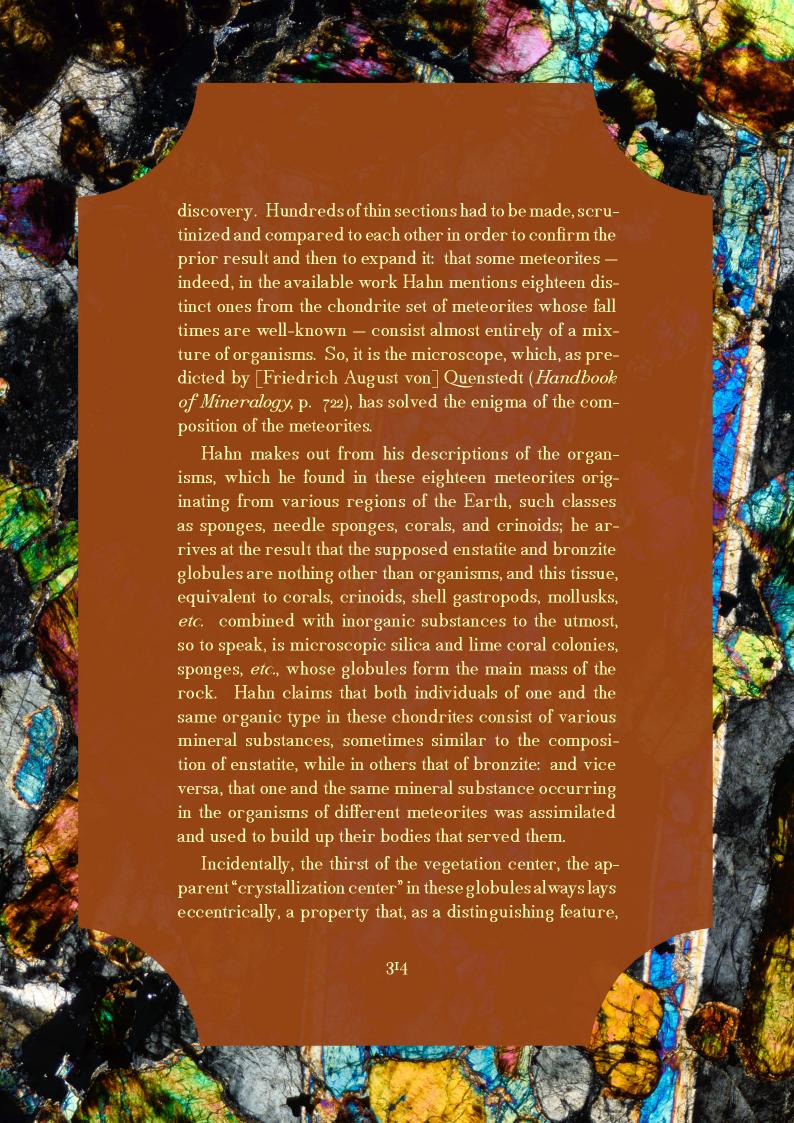


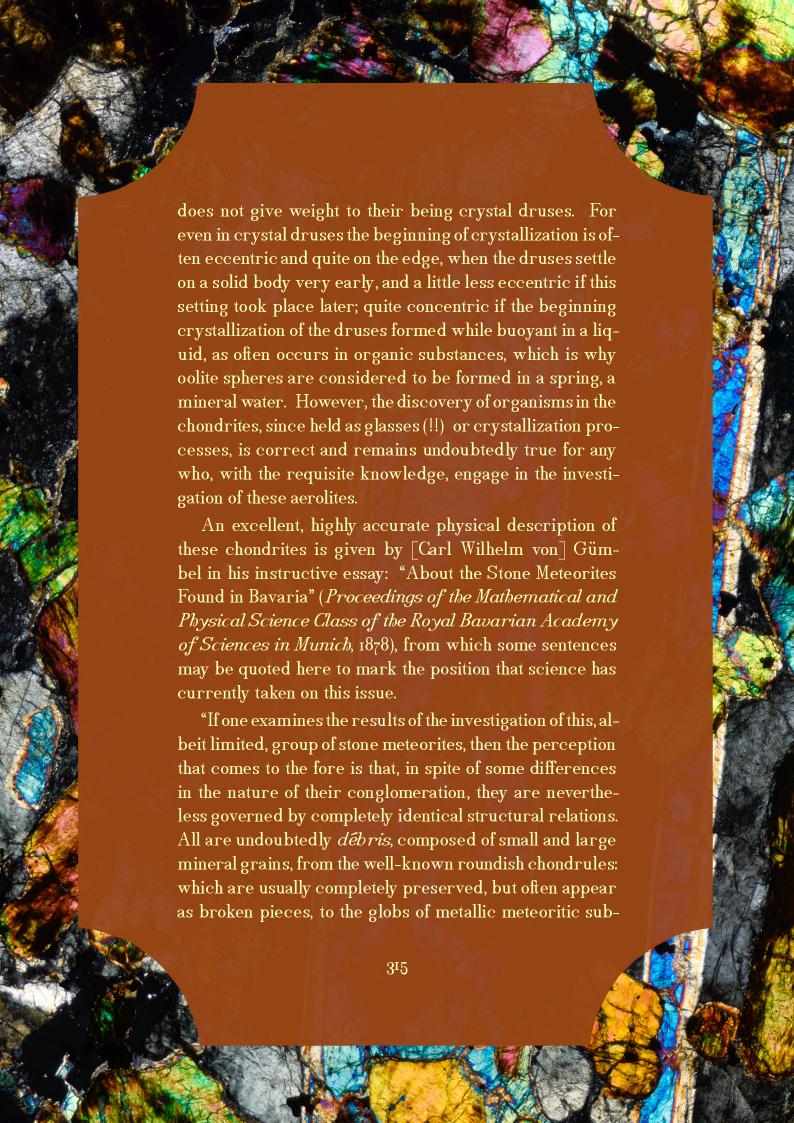


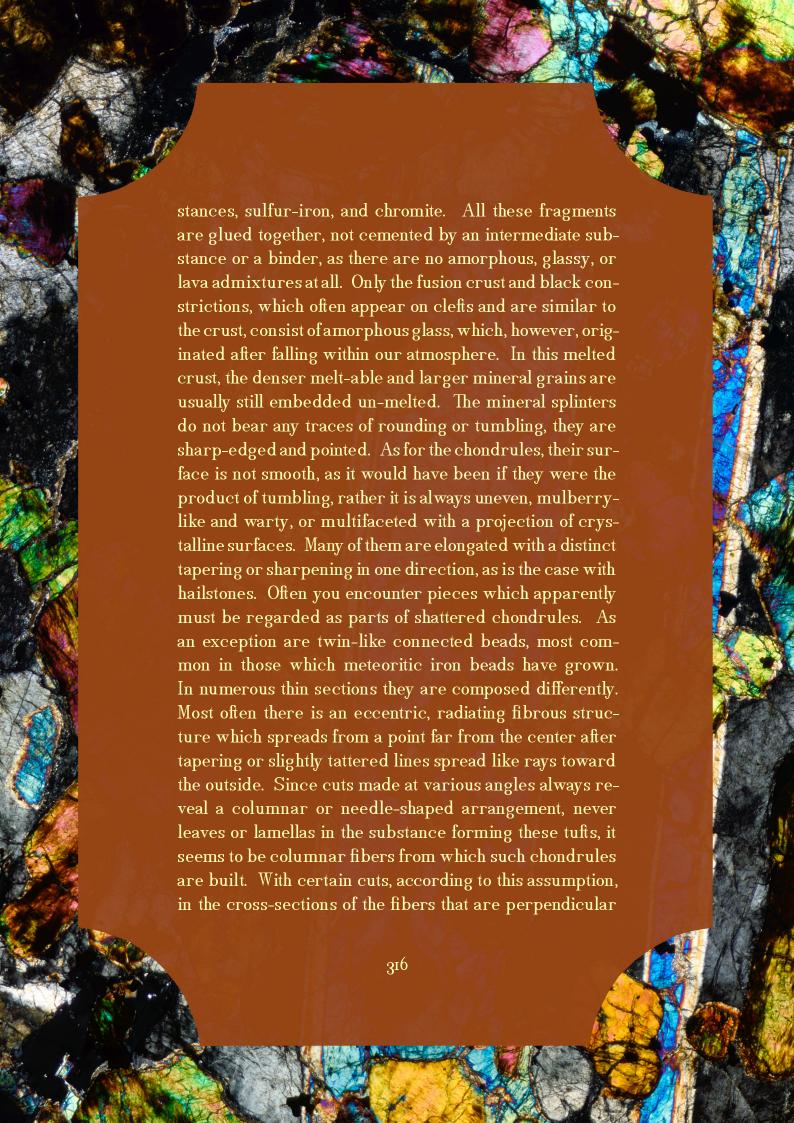


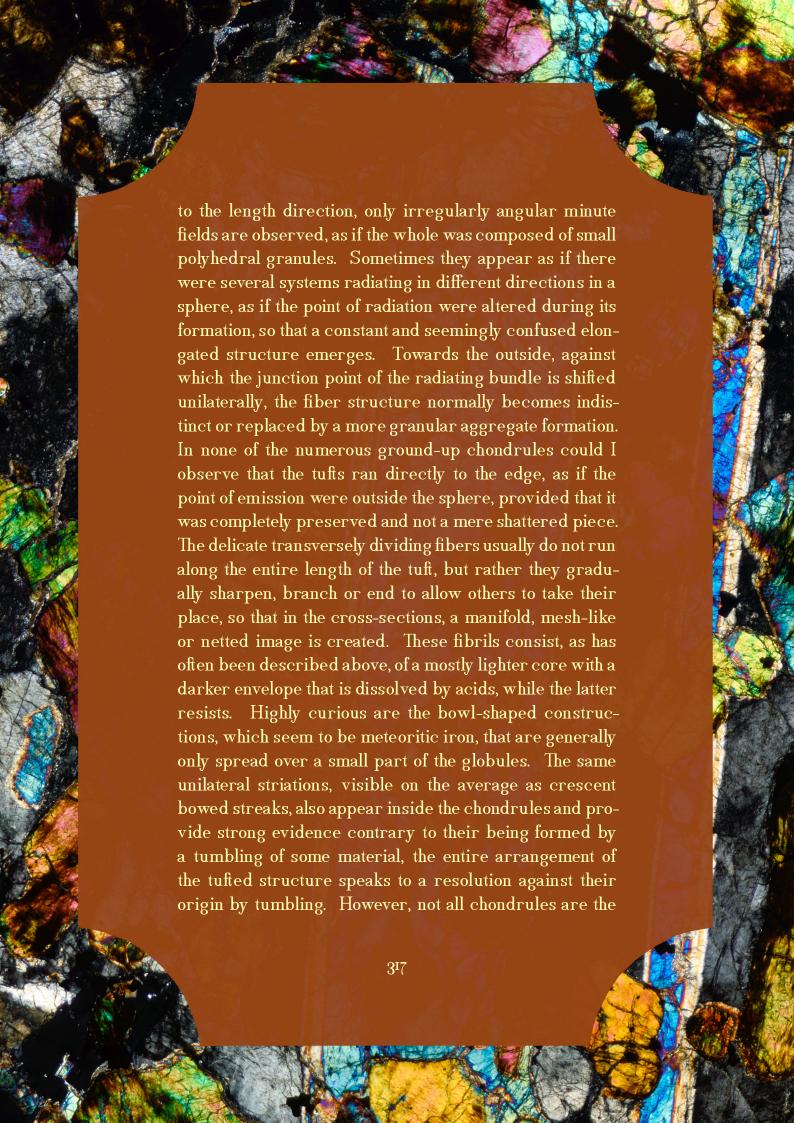
comets indicates that they are, so to speak, celestial bodies in the process of consolidation; that they consist of a glowing liquid or vaporous core and a frozen shell, a mantle, which is less hard, and corpuscles far from each other's vicinity which form a long luminous tail: corpuscles that are often seen as shooting star swarms on Earth after the main body of the comet has long since passed. The distance between the corpuscles forming the tail would have to be very considerable, since even the smallest stars can be seen shimmering without loss of light through the mass forming the tail, a length of more than 20,000 miles. At their extraordinary distance from the core of the comet these laggards probably follow gravity and fall down to Earth as meteorites. Microscopic research discovered in these stones a mixture of granular crystalline metal and mineral bodies, above all iron in conjunction and mixed with nickel, cobalt, titanium, copper, tin, silica, magnesium and other substances. Some aerolites consist almost entirely of metallic iron and its metal alloys, while others almost exclusively of non-metallic mineral bodies. Depending on whether the iron alloys form the main mass, more or less coherently, or are in grains consisting of a mixture of quartz and silica compounds (very often as bronzite, olivine, and augite), or with the latter appearing more or less uniformly mixed with meteoritic iron grains, they become pallasites or mesosiderites. A third class, the most frequent of the falling meteor stones, consists of a lighter or darker matrix that is formed from a mixture of meteoritic iron, pyrrhotite, chromium, titanite, olivine, augite, bronzite, 312

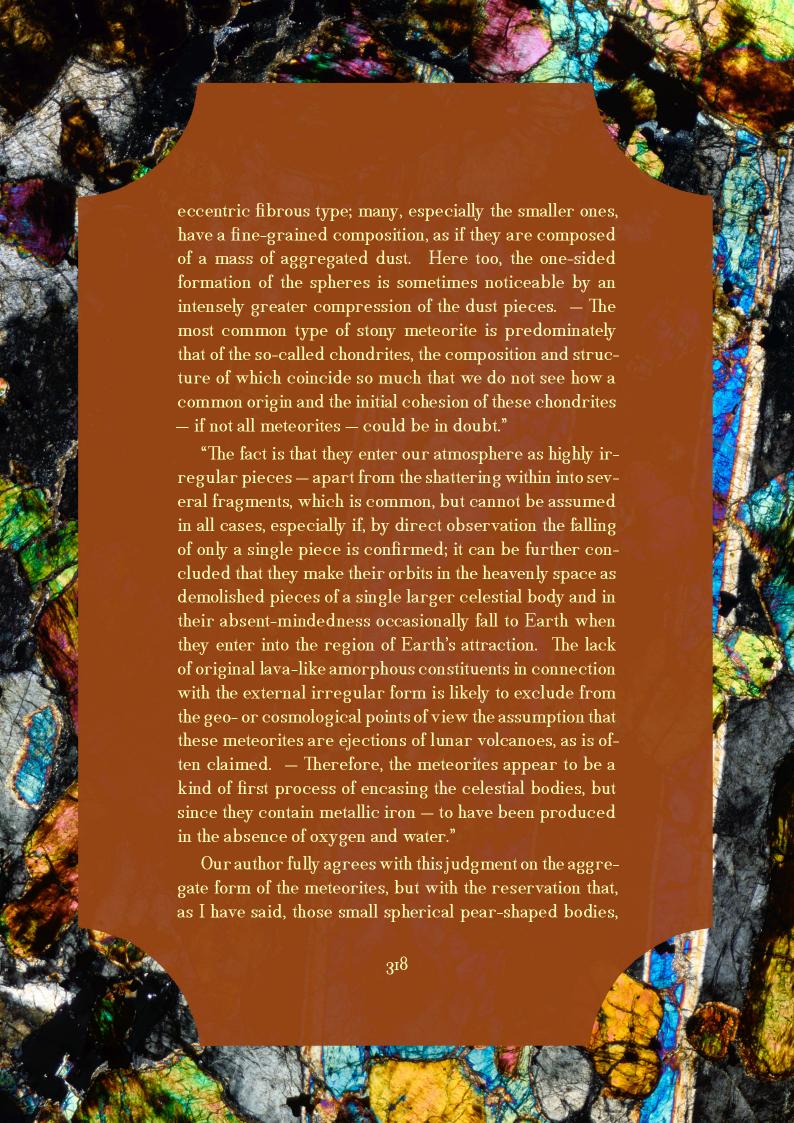




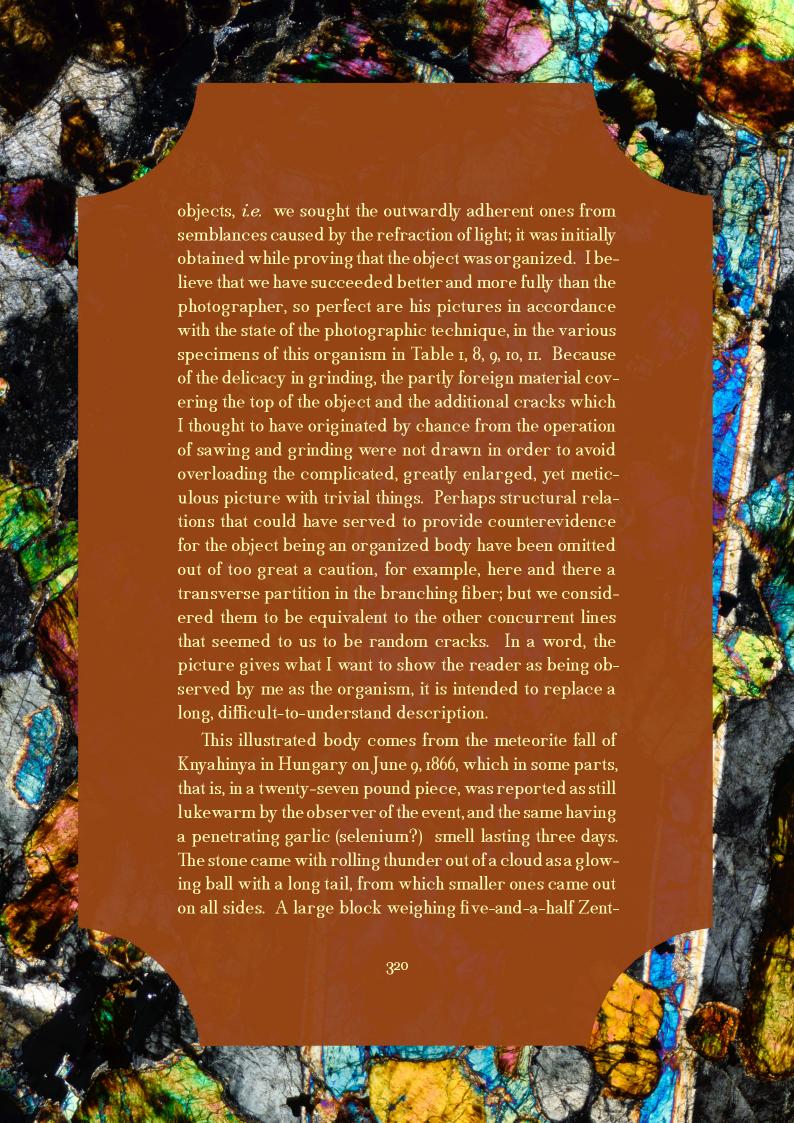




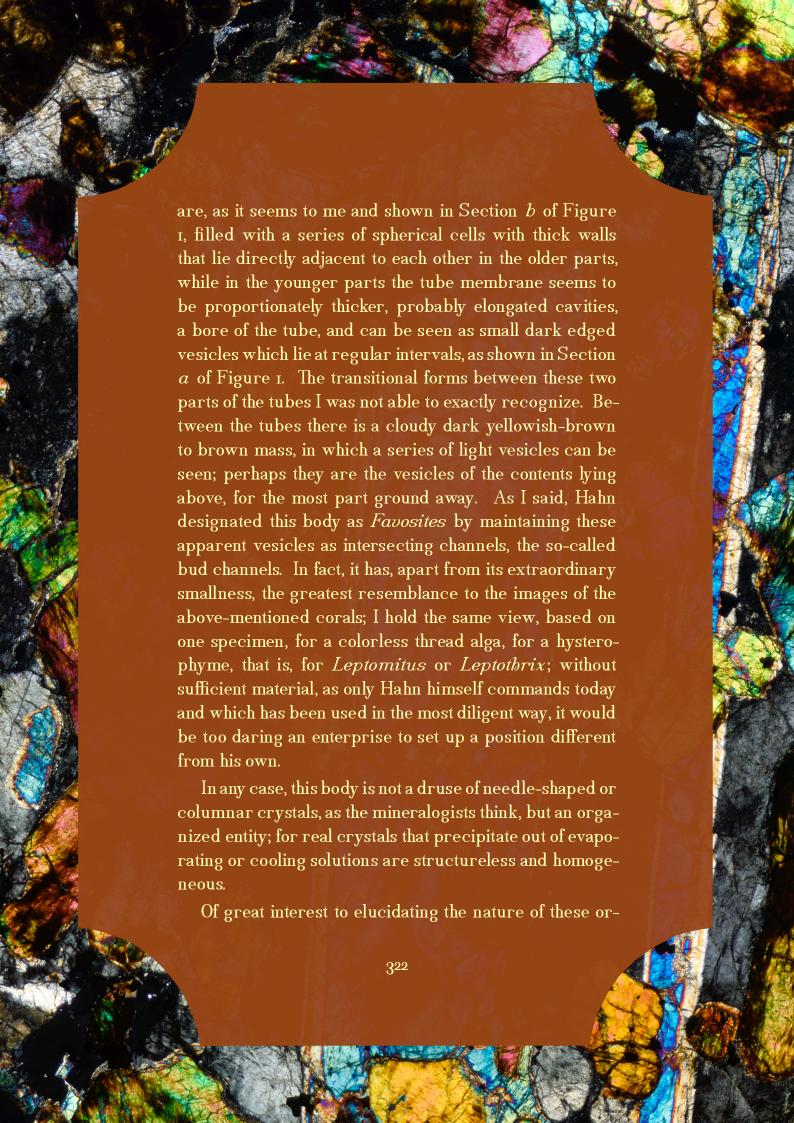




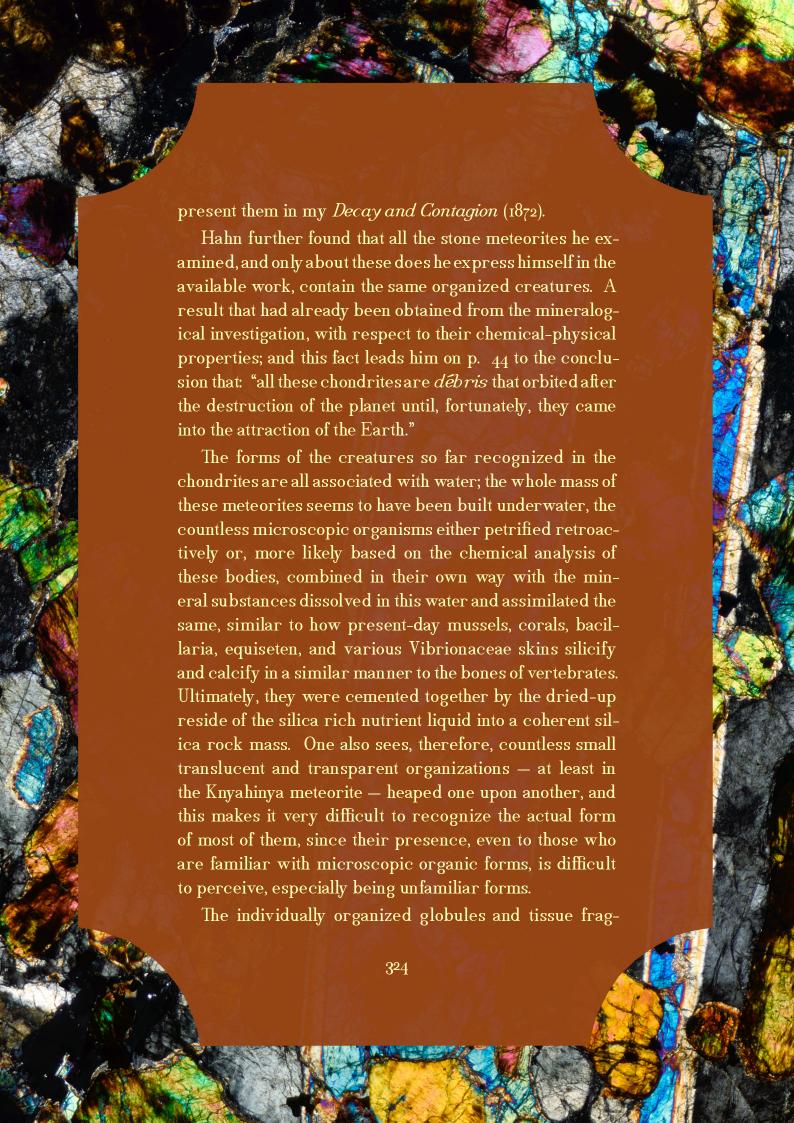












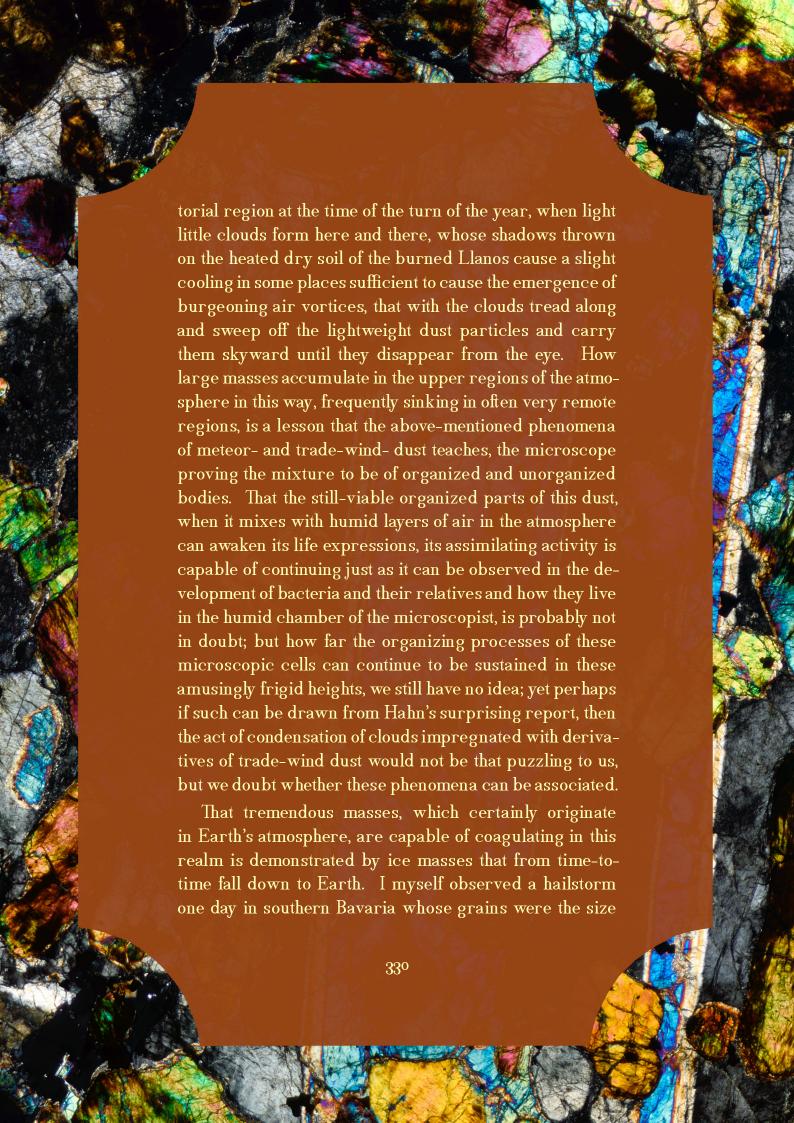












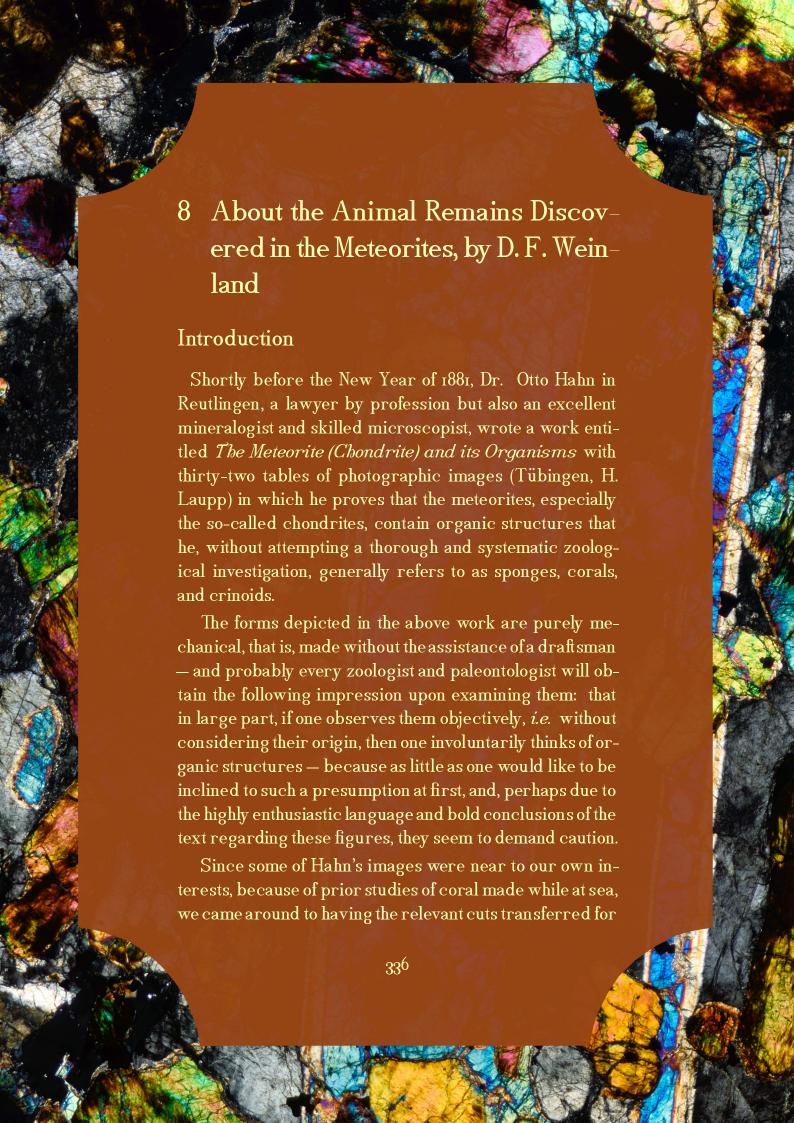




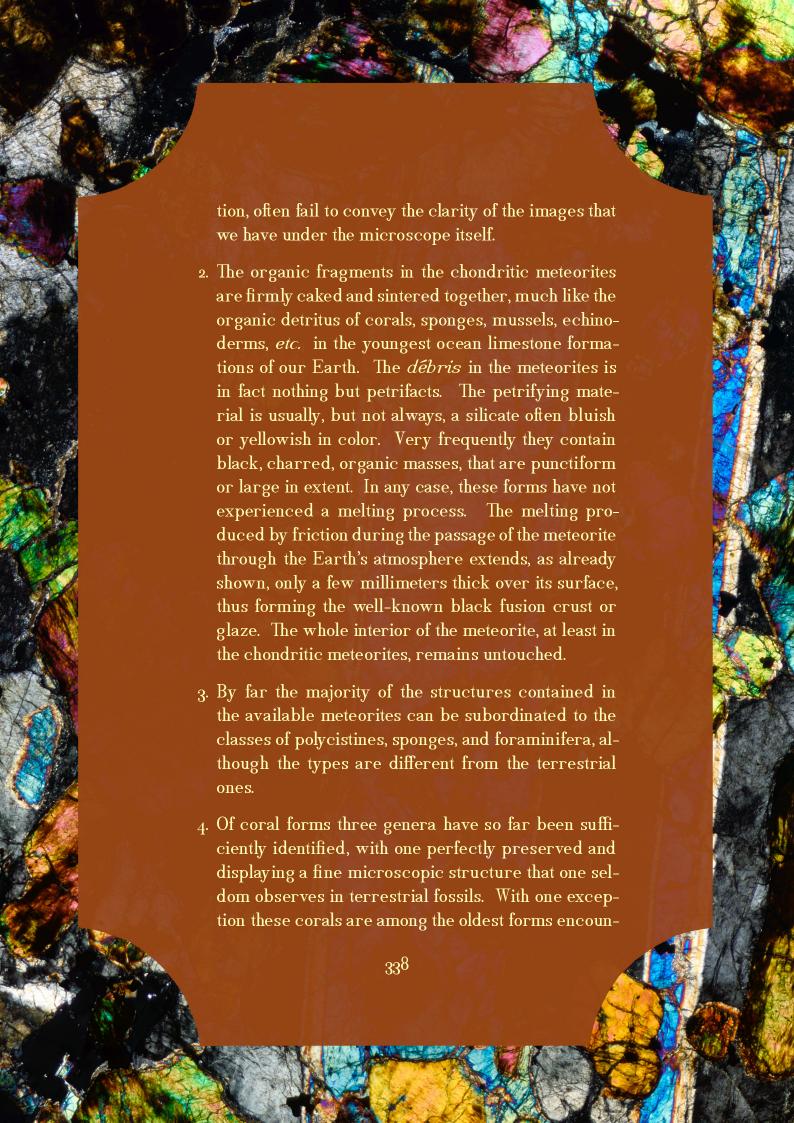


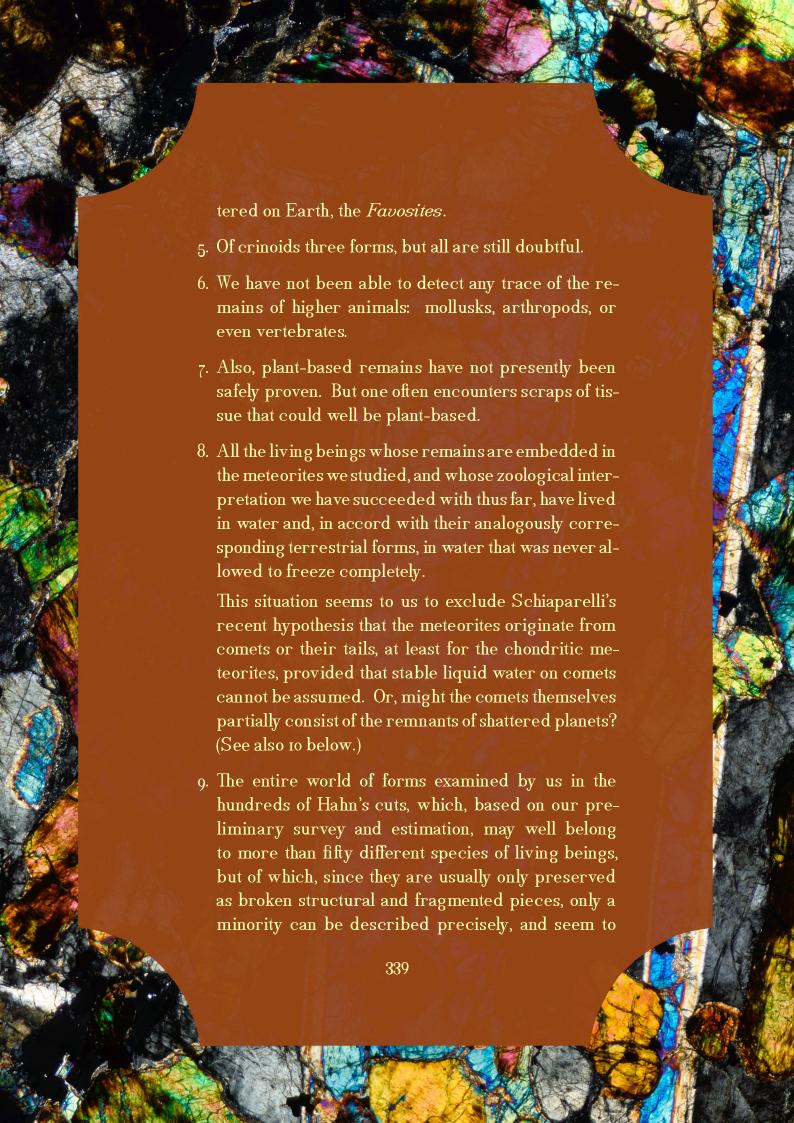


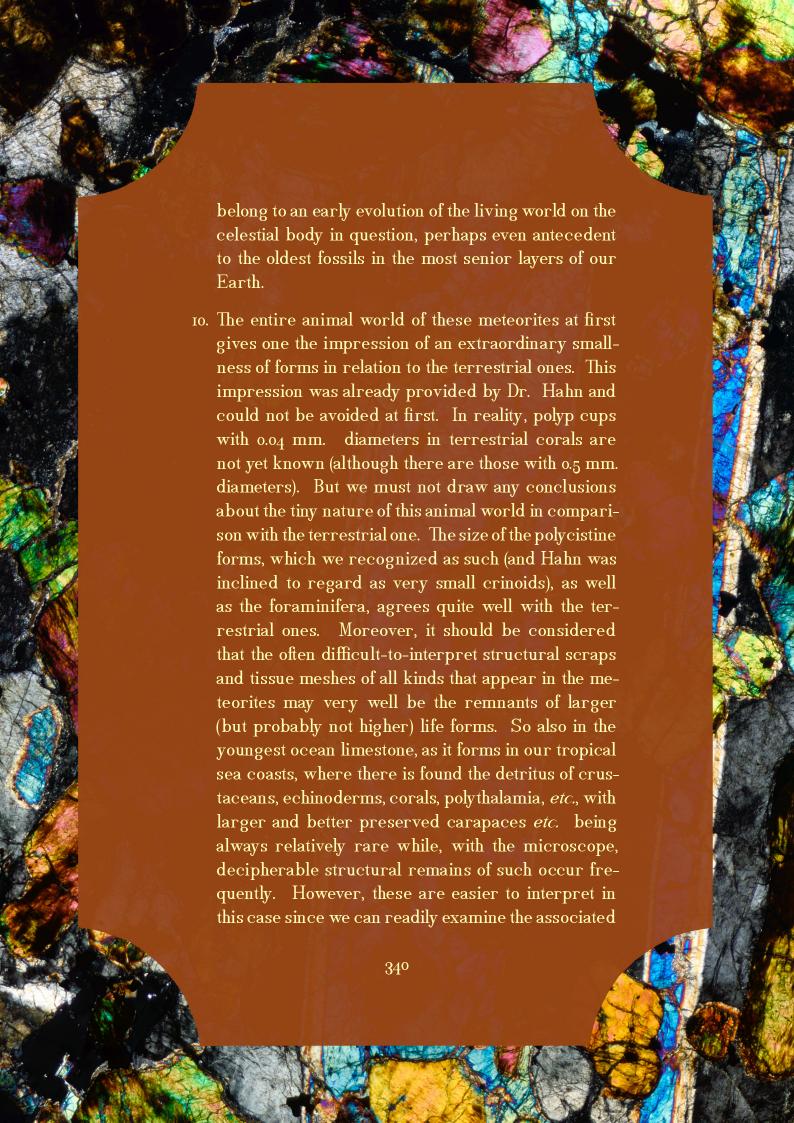




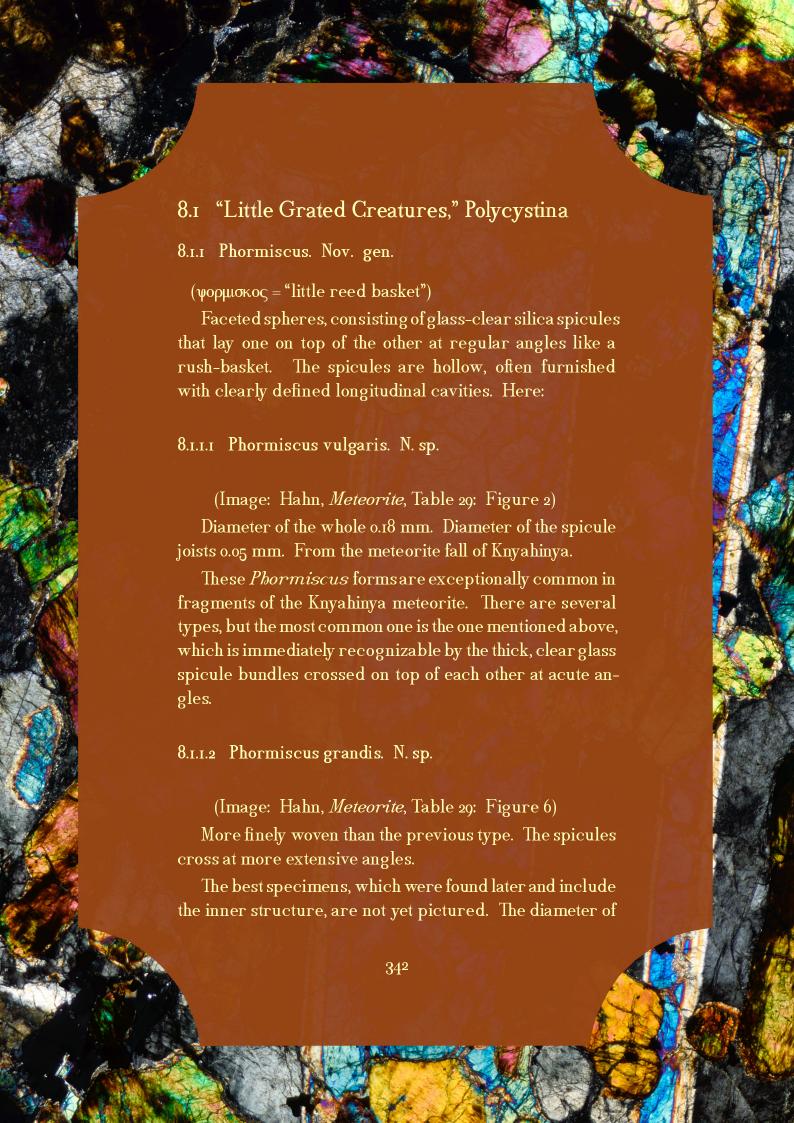
closer inspection. Thereafter, Dr. Hahn provided his entire considerable collection of meteorite cuts, made with great sacrifices of time and money. These cuts, more than six hundred in number, come from eighteen different meteorite falls, mostly duplicates of the Viennese and the extremely rich Tübingen collection. All meteorites are reliably certified and belong to falls from Europe, Asia, and America, some of them from the previous century. An in-depth study of them this past year has provided the following preliminary results: 1. The important discovery of Hahn's, great in its consequences, has essentially been confirmed. By far the majority of the forms photographically depicted by Hahn definitely deal with organic remains and have to do with organic structure, indeed, these remains occur in such quantities that some cuts are for the most part composed entirely of them. Well-preserved forms are rare; in the majority it is detritus, large or small, but usually very distinct fragments, the dimensional stability of which can be recognized quite well after one compares many cuts together with the bulk of the material, and as soon as one has familiarized oneself with this strange world of forms, all the more so since individual pieces have been completely preserved or even favorably polished by accident, and can soon provide the best possible way to orient oneself and serve as guiding pieces. However, we expressly state here that the photographic images of Hahn, meritorious as they are, and as much as his above-mentioned work will always remain a founda-337

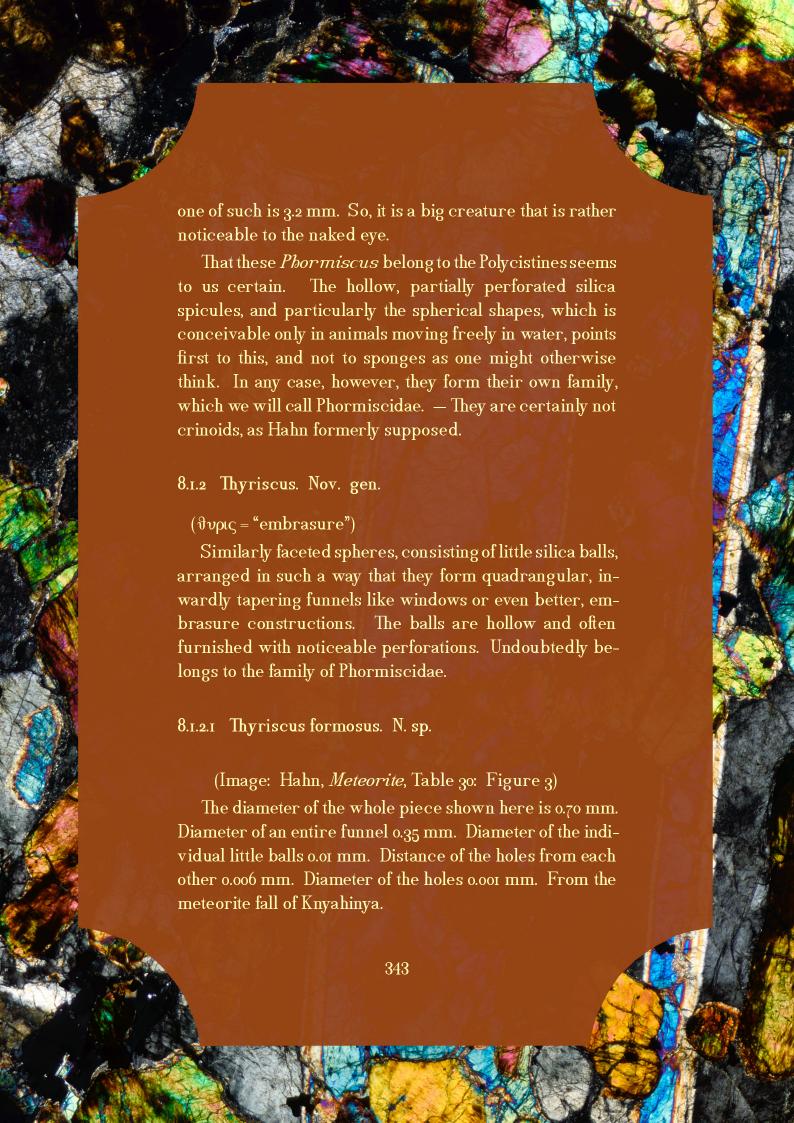


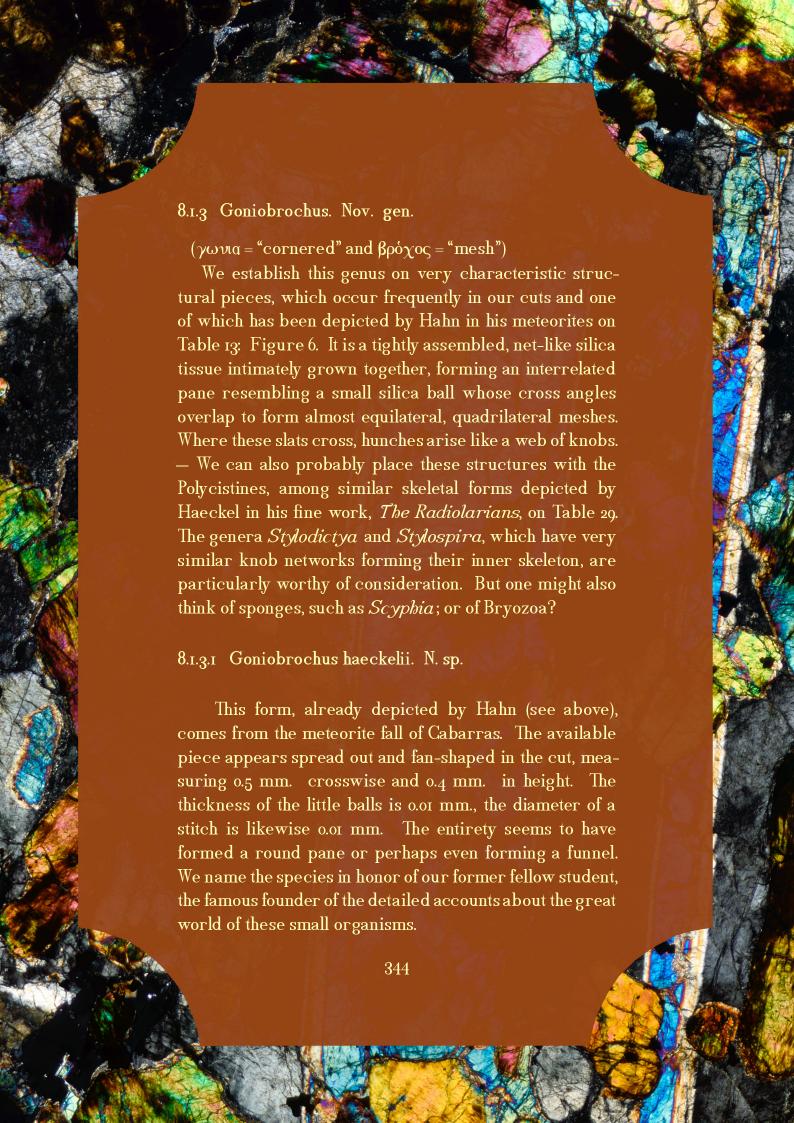


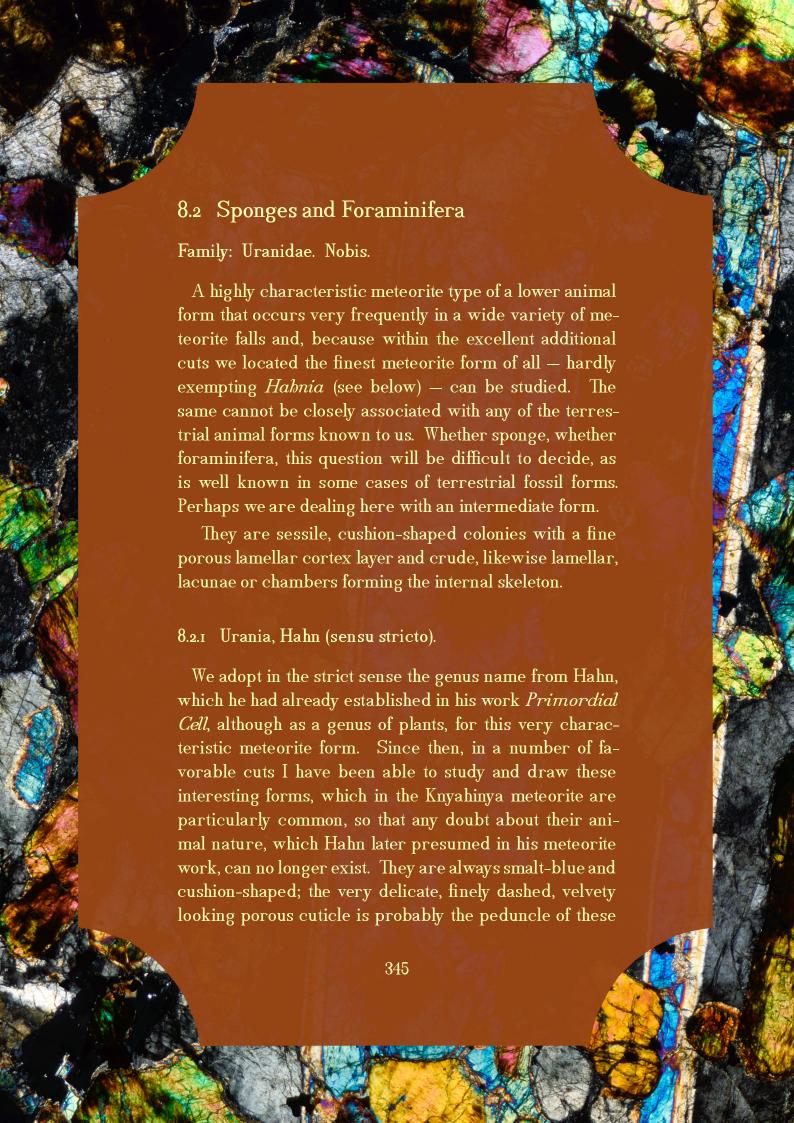


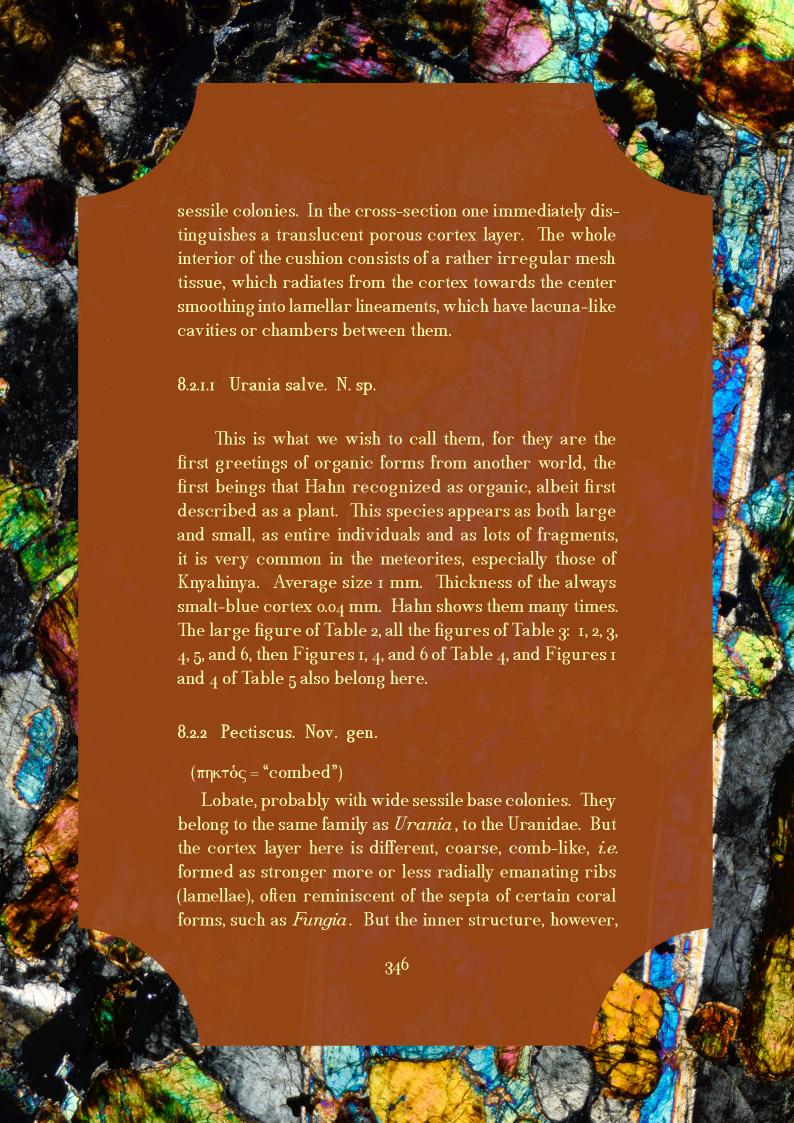




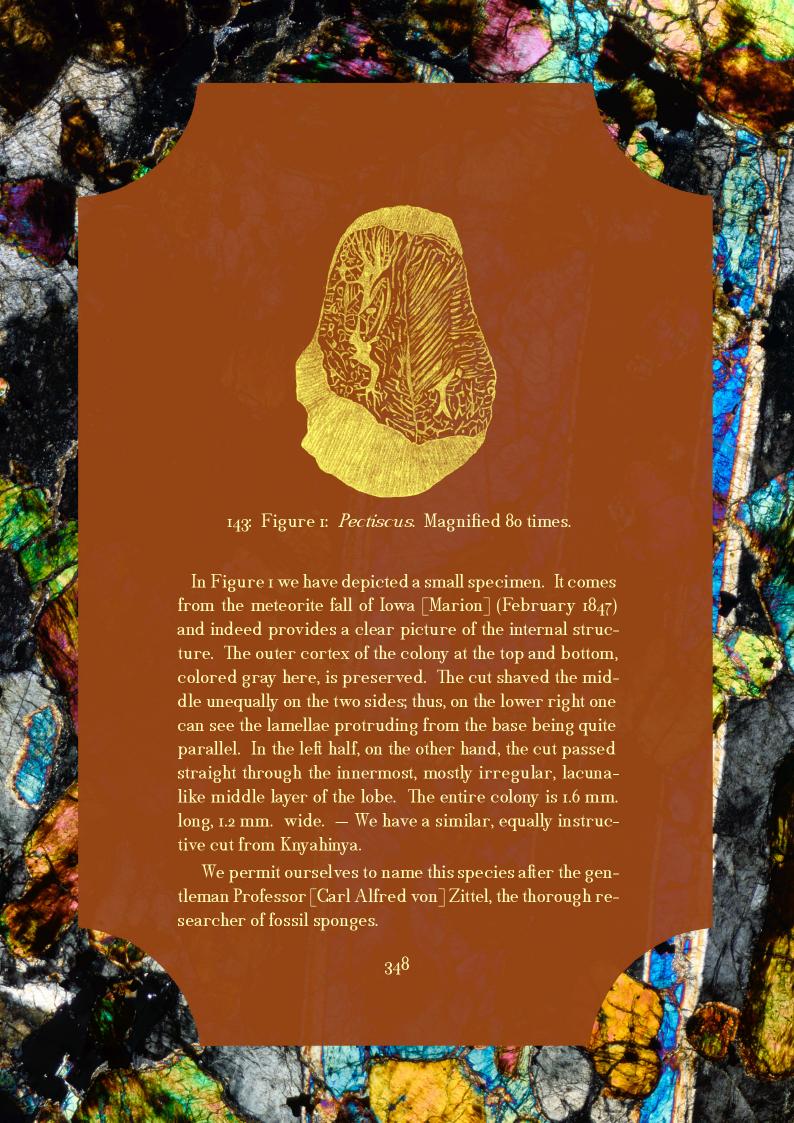


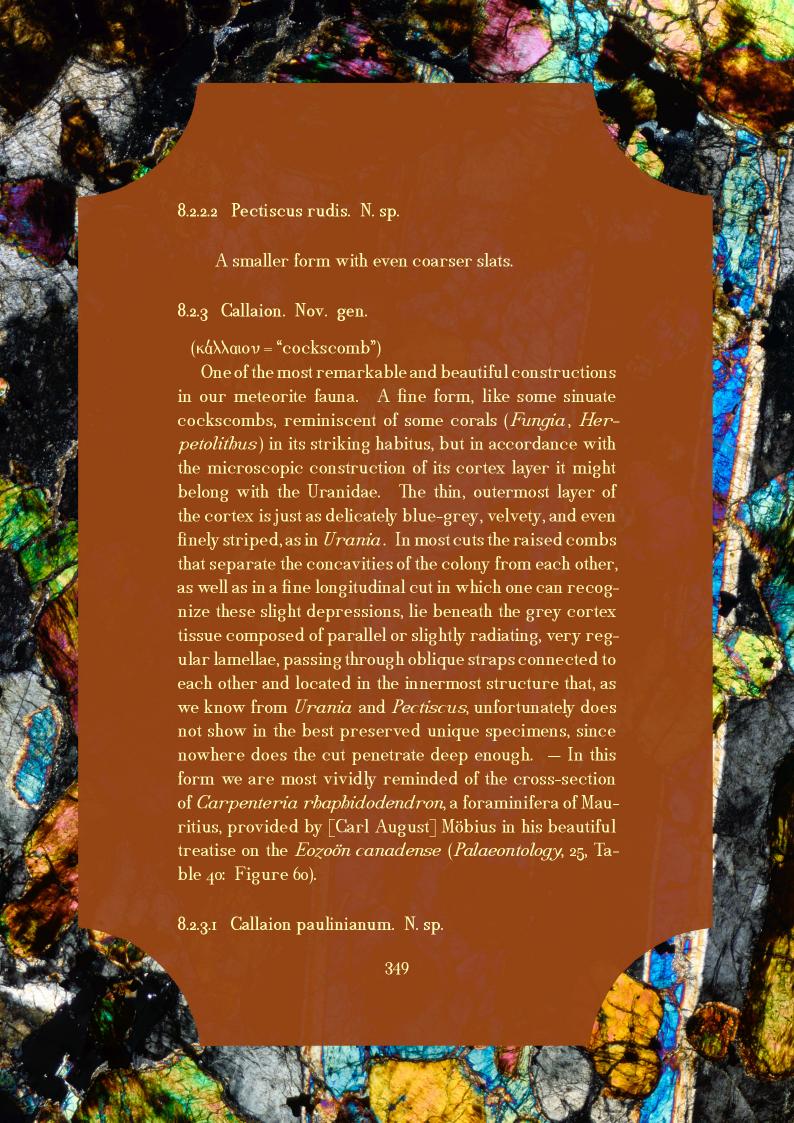


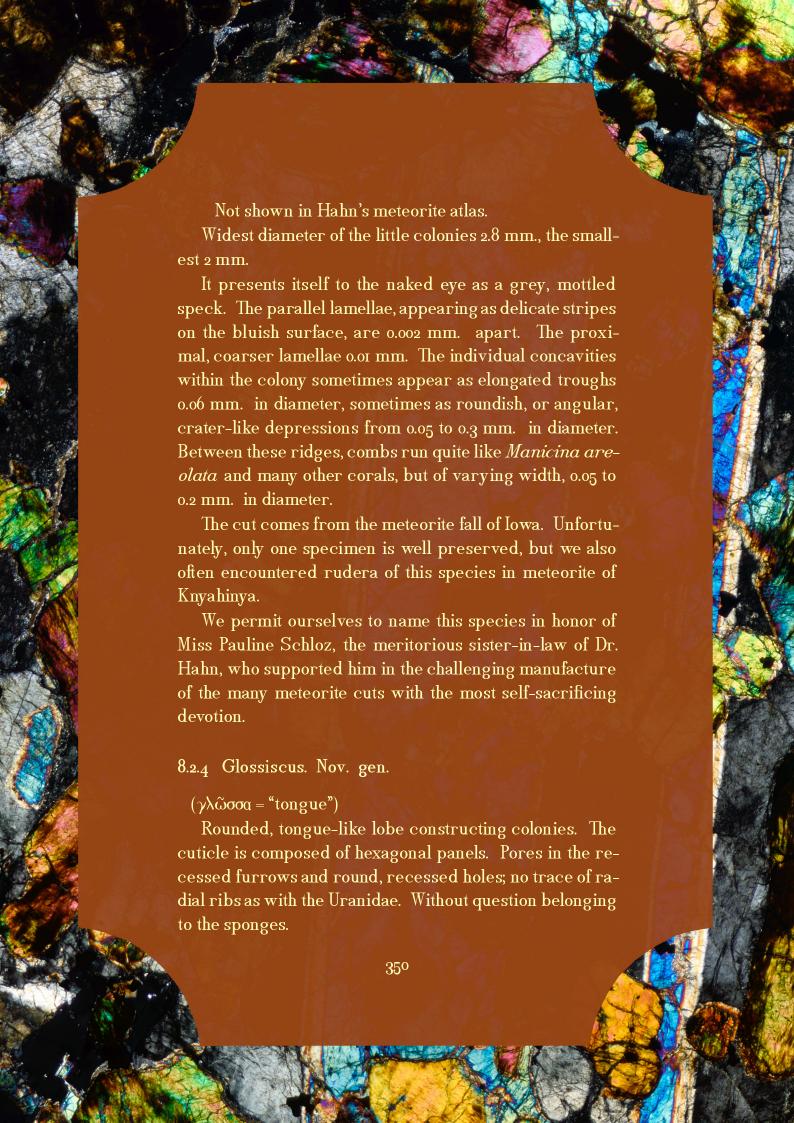


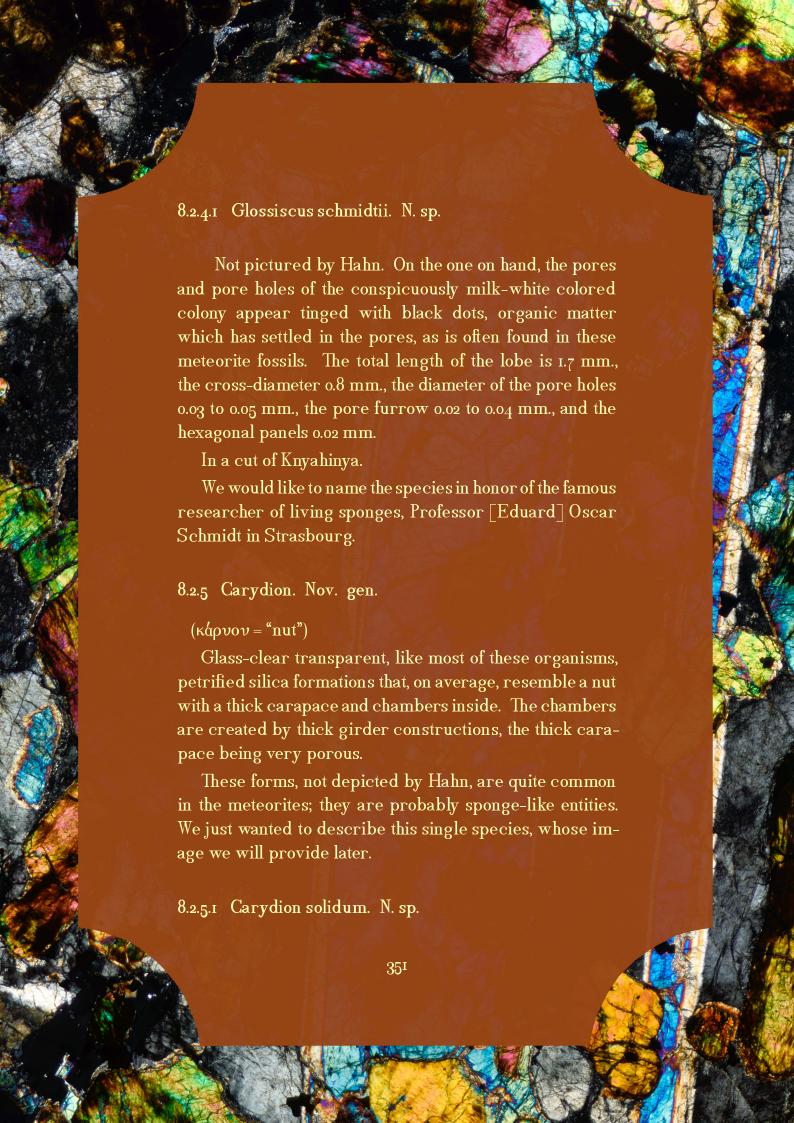


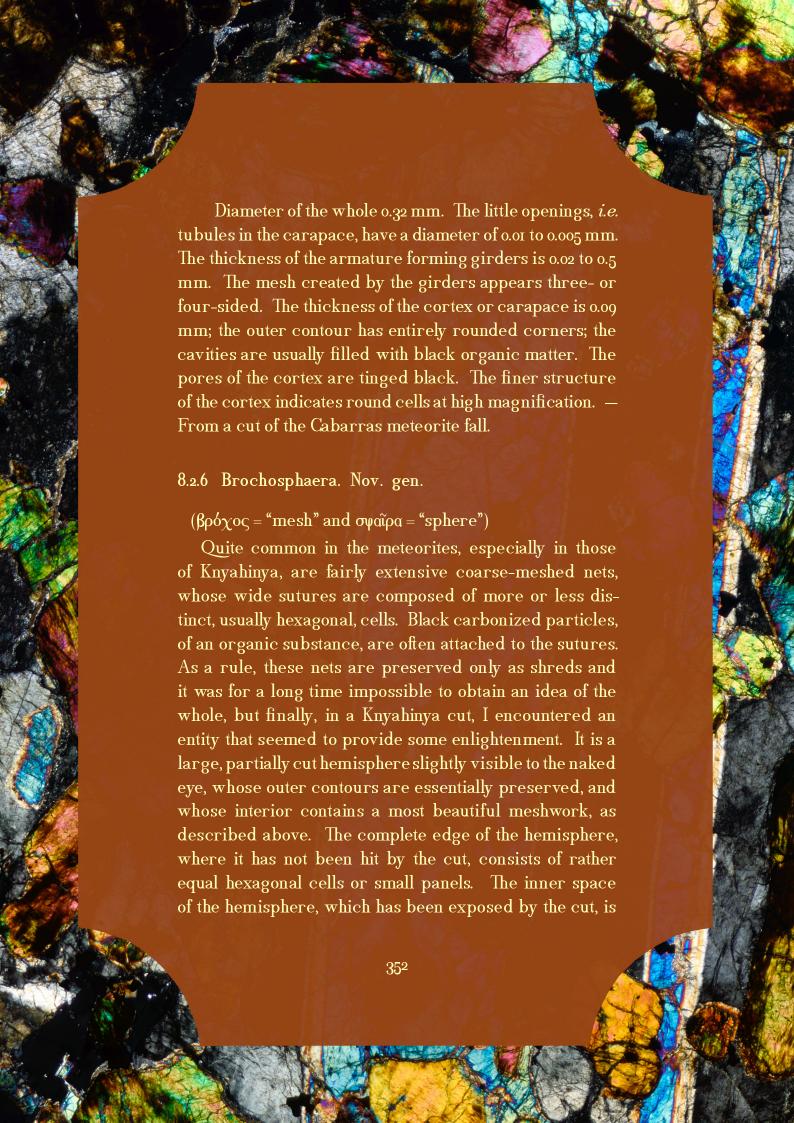


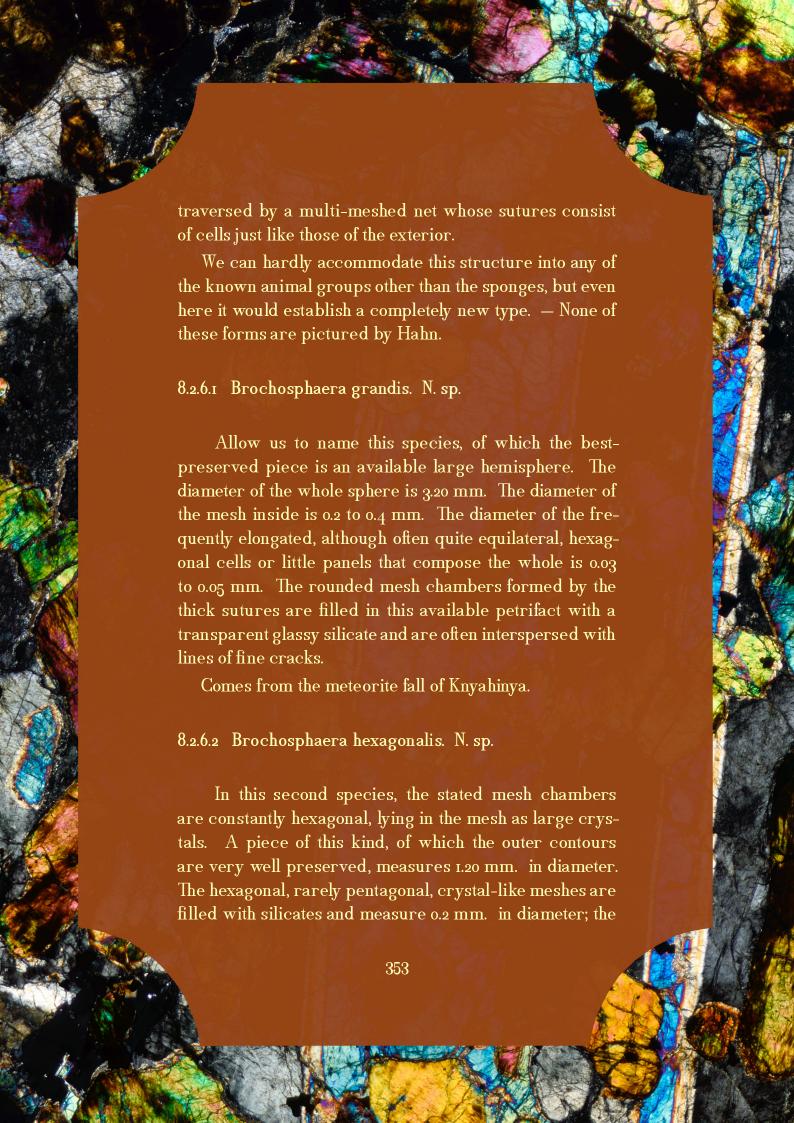


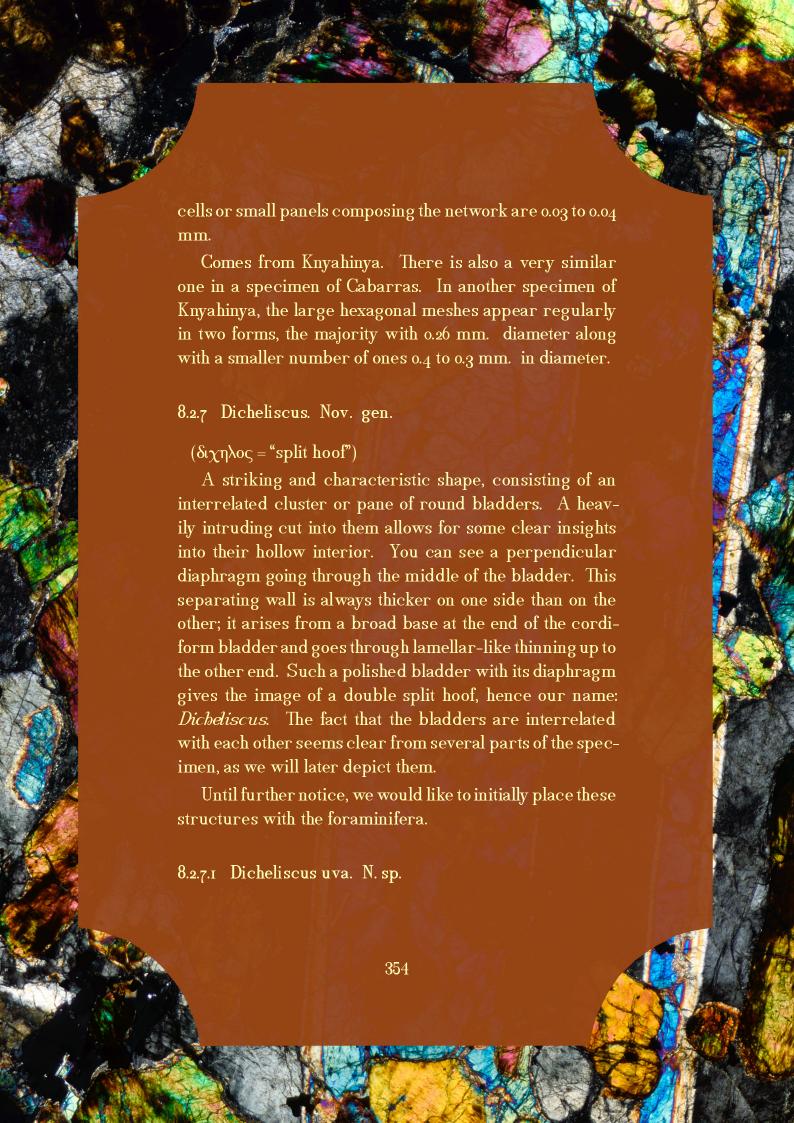


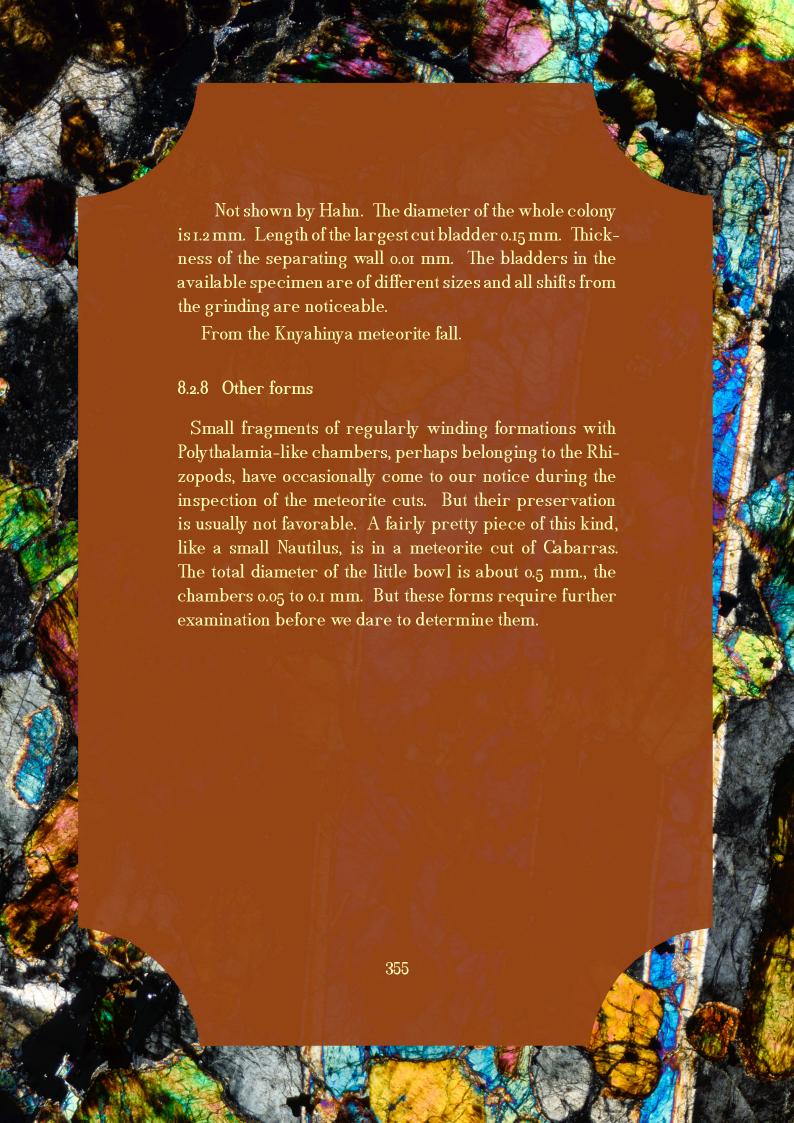


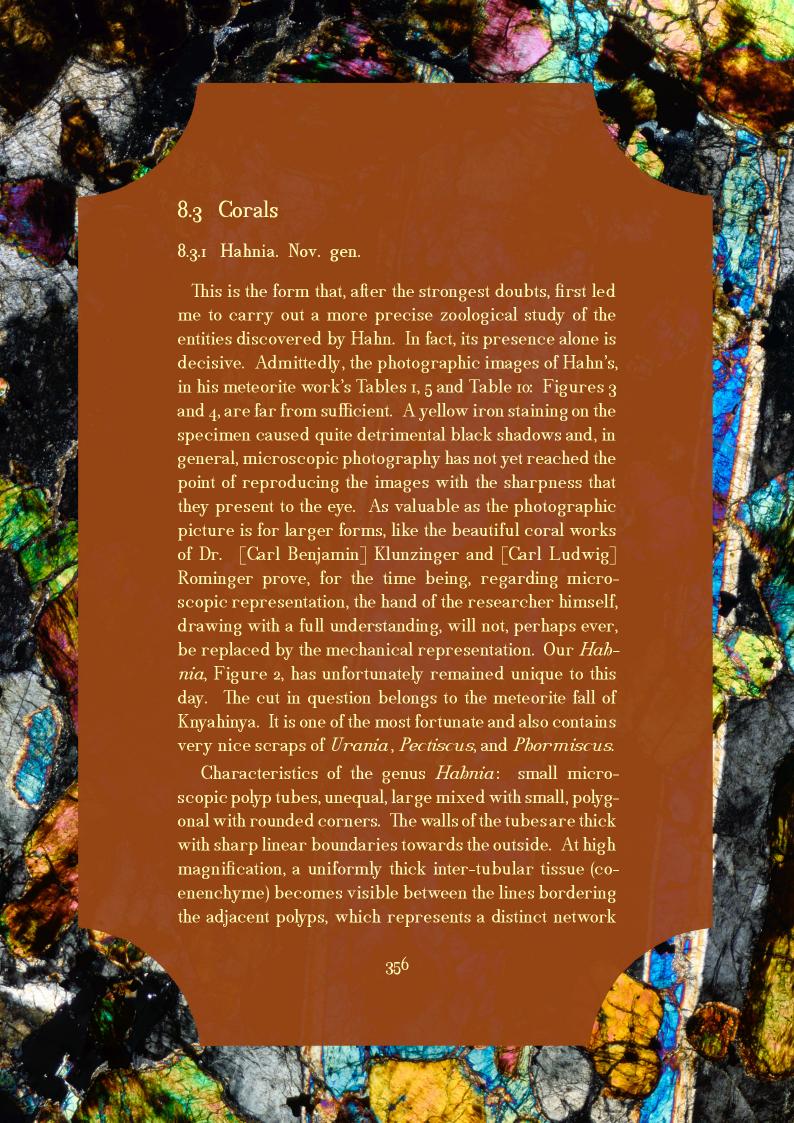




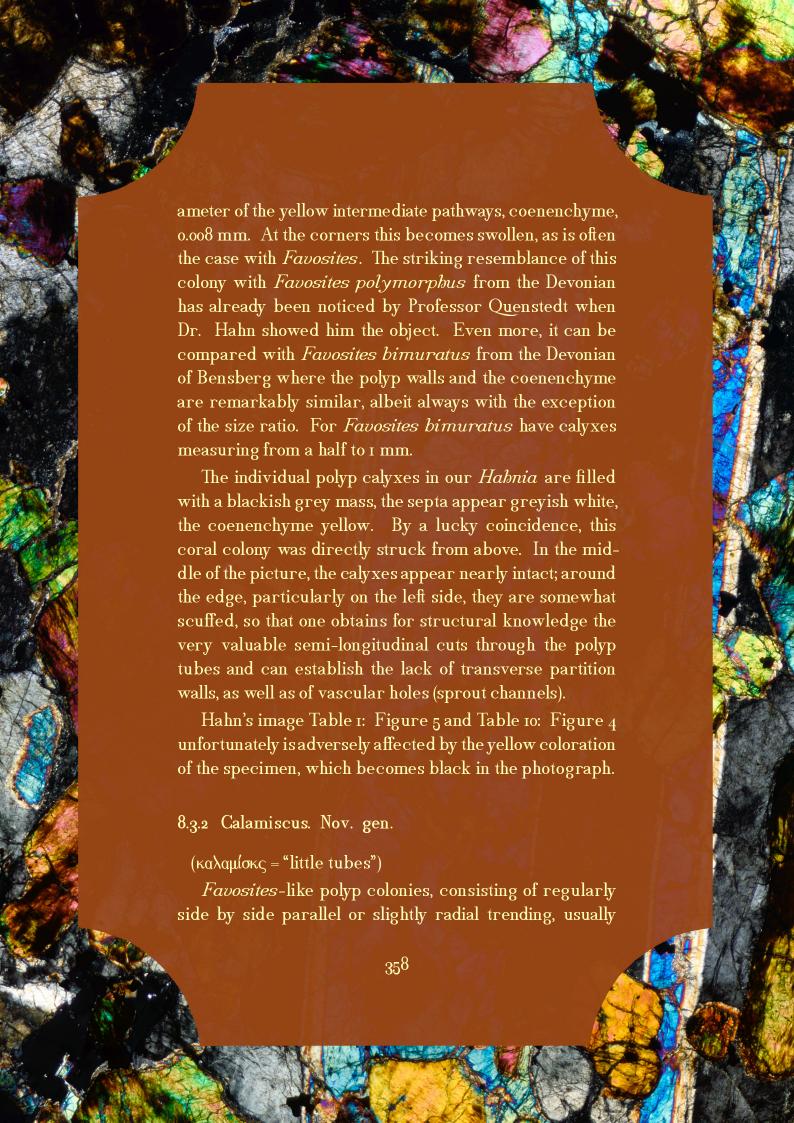


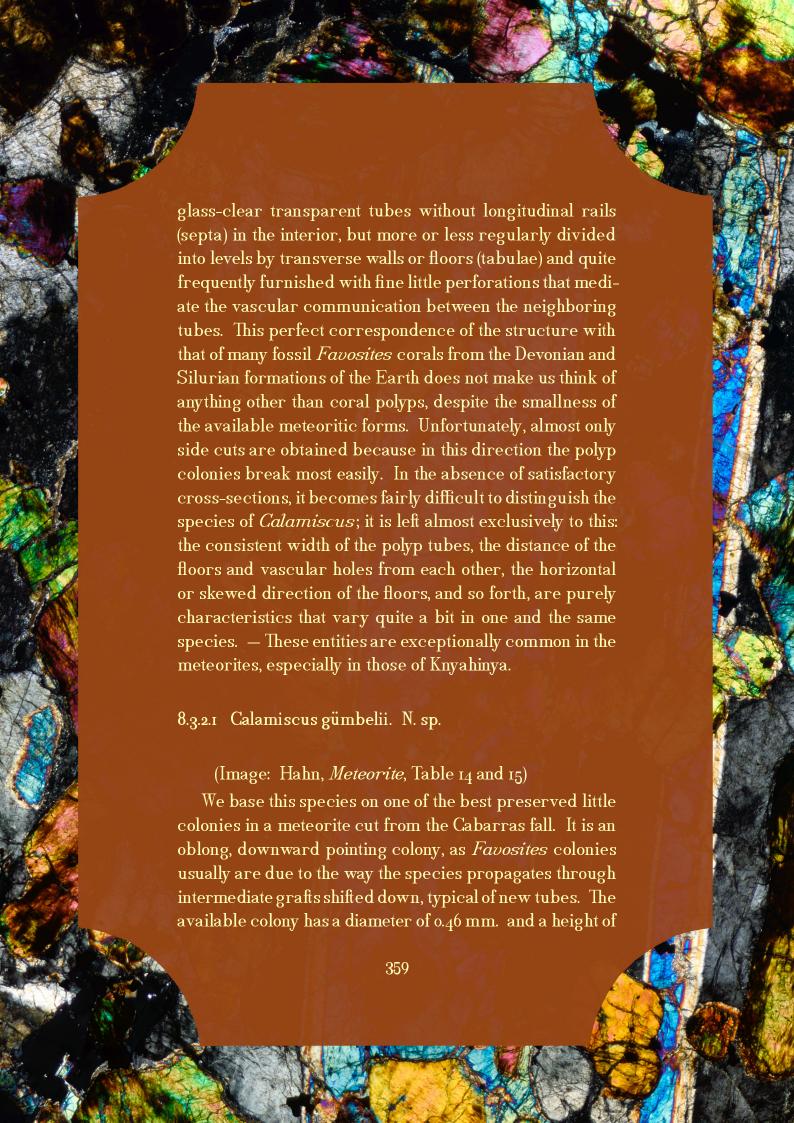


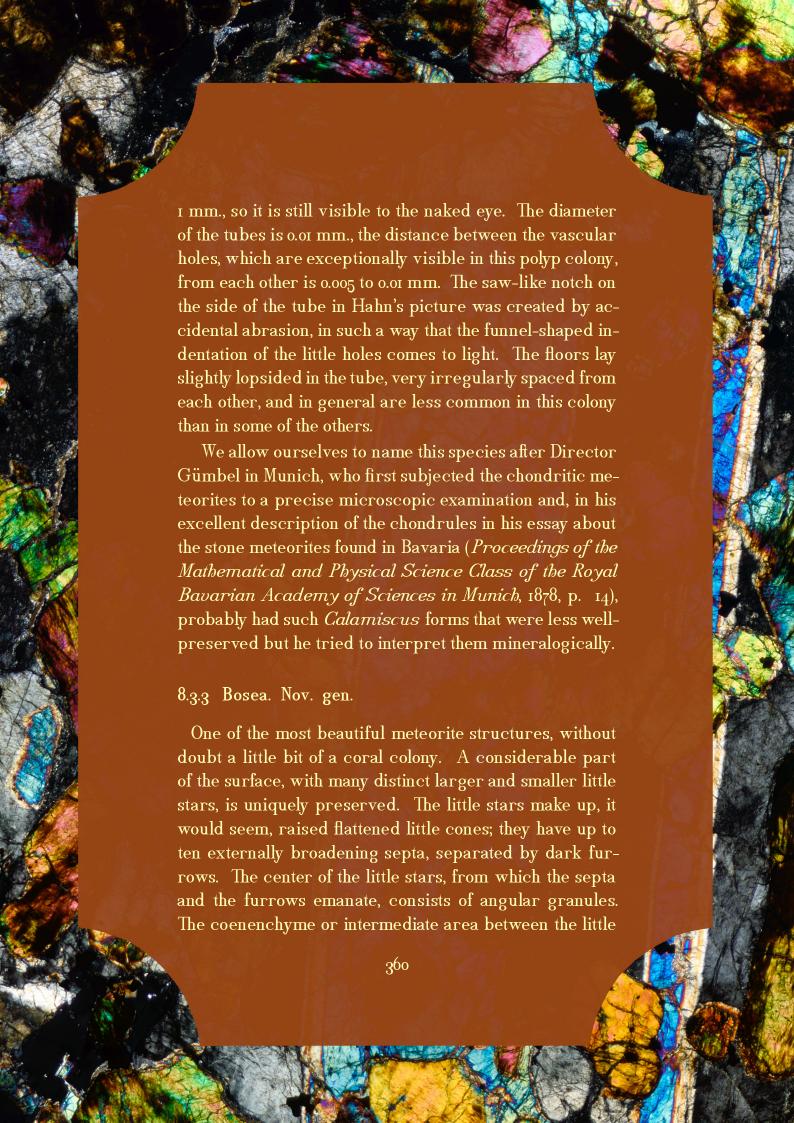


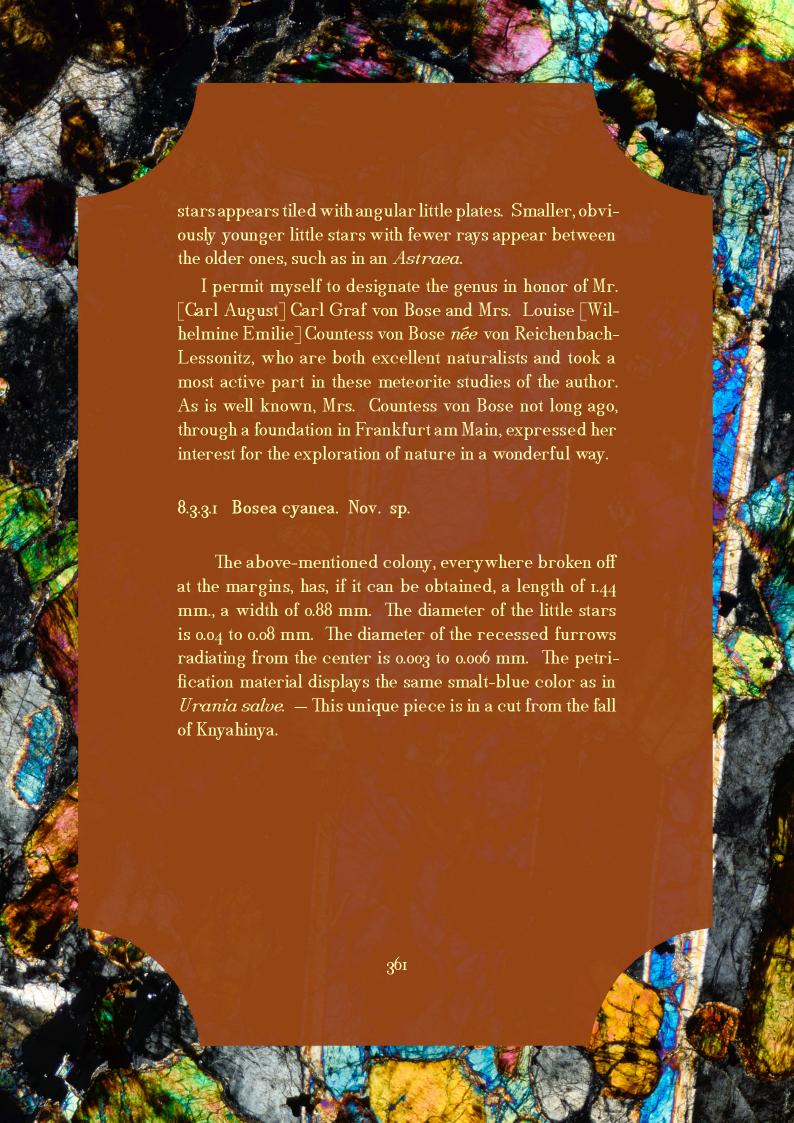


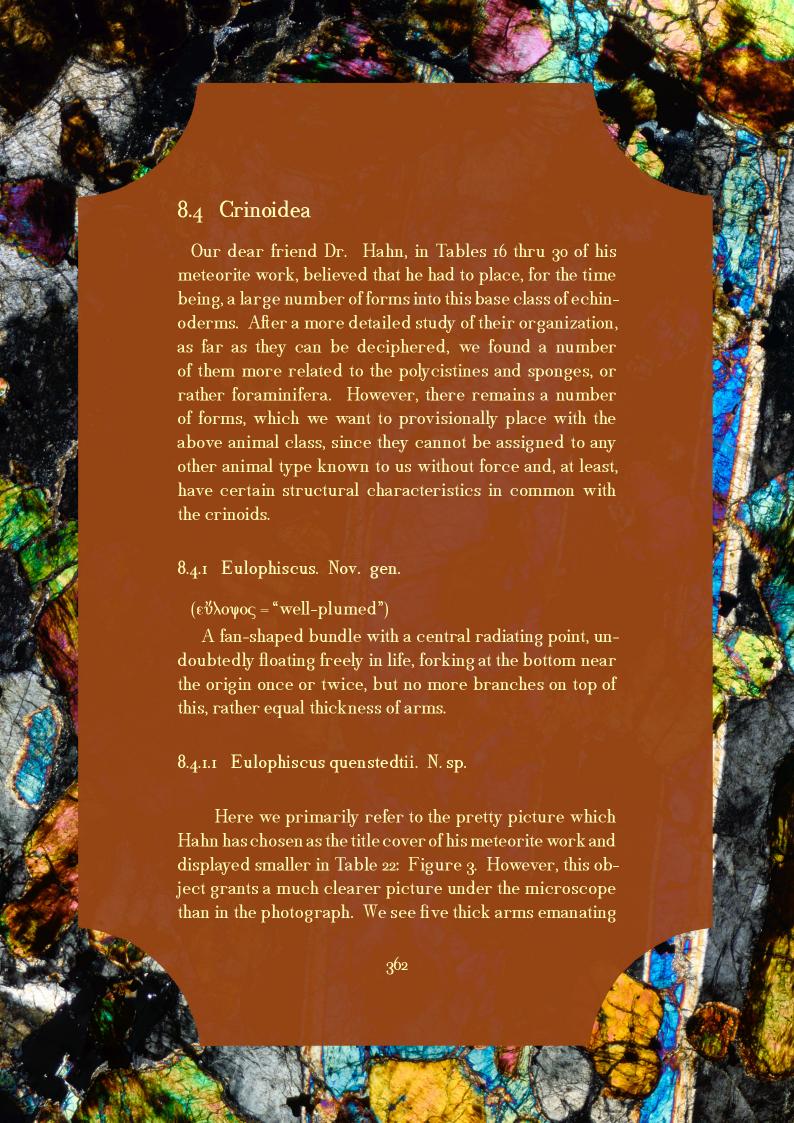


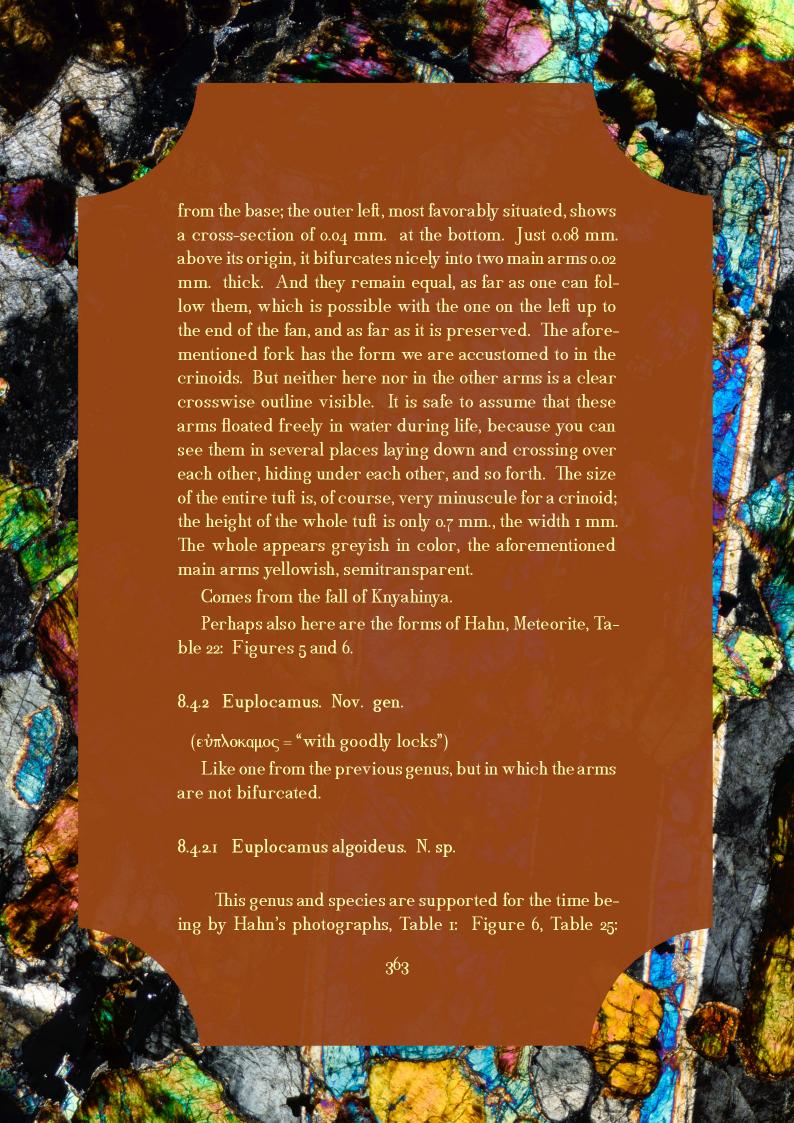




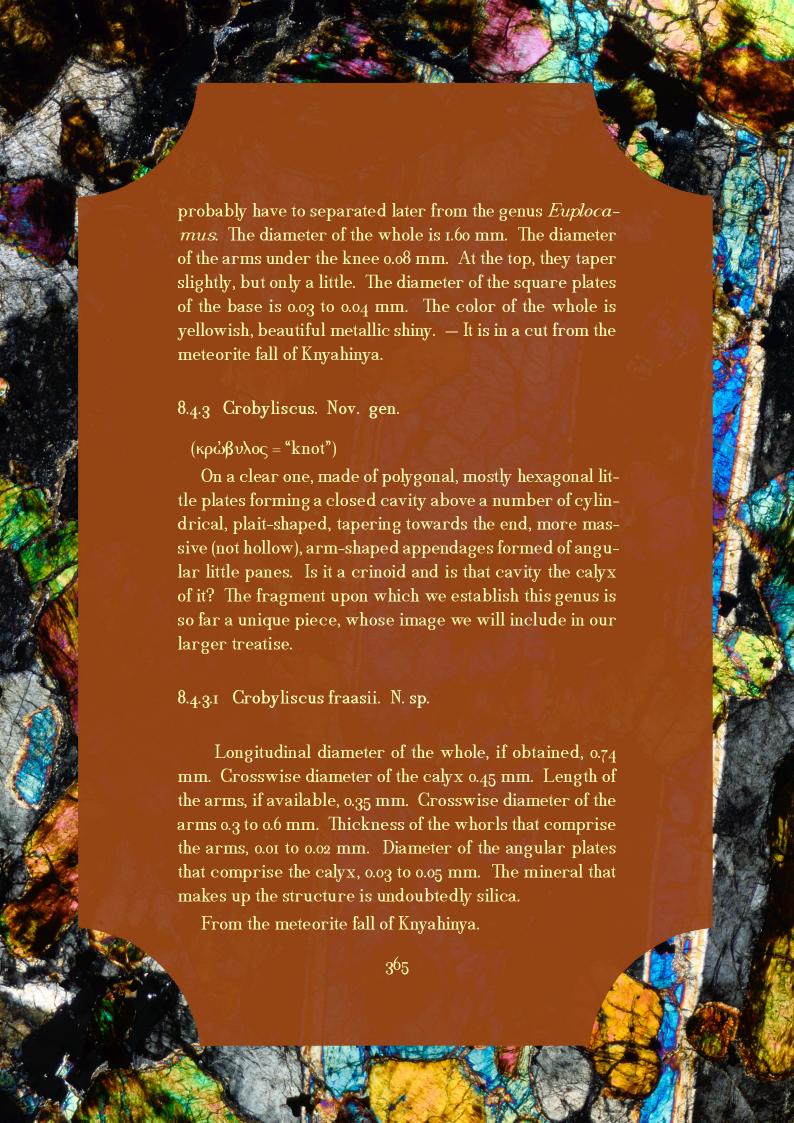


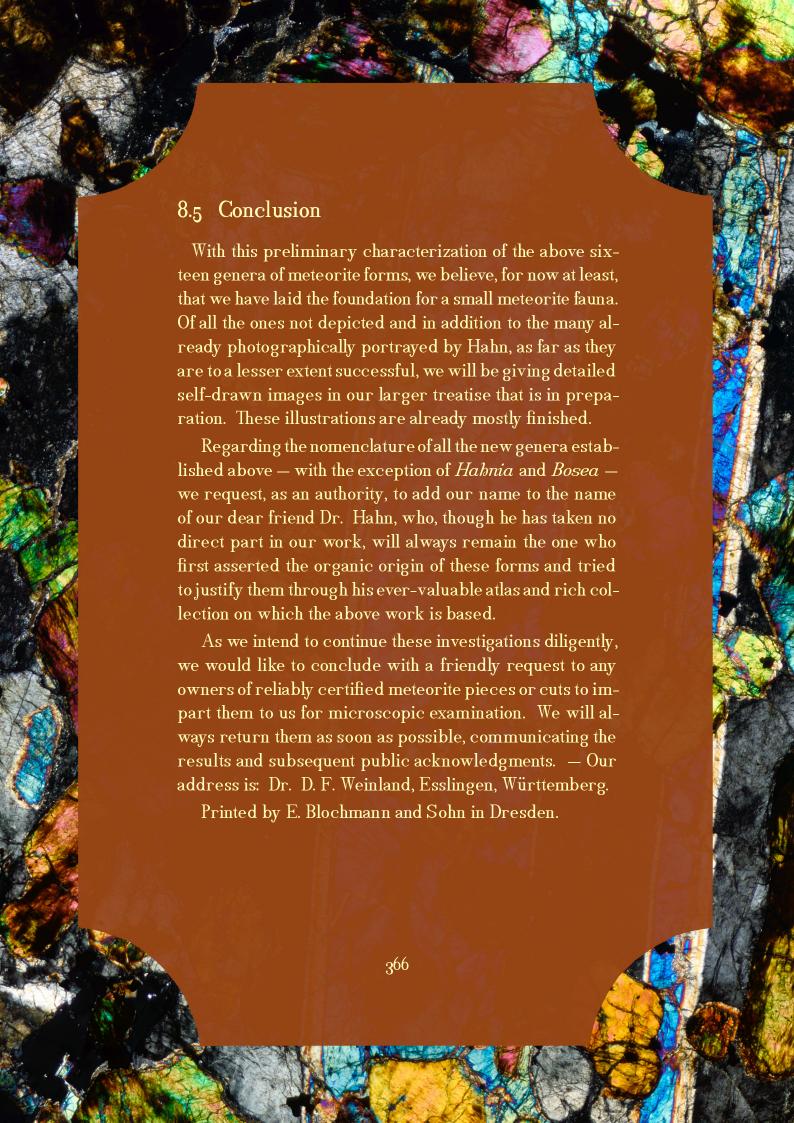


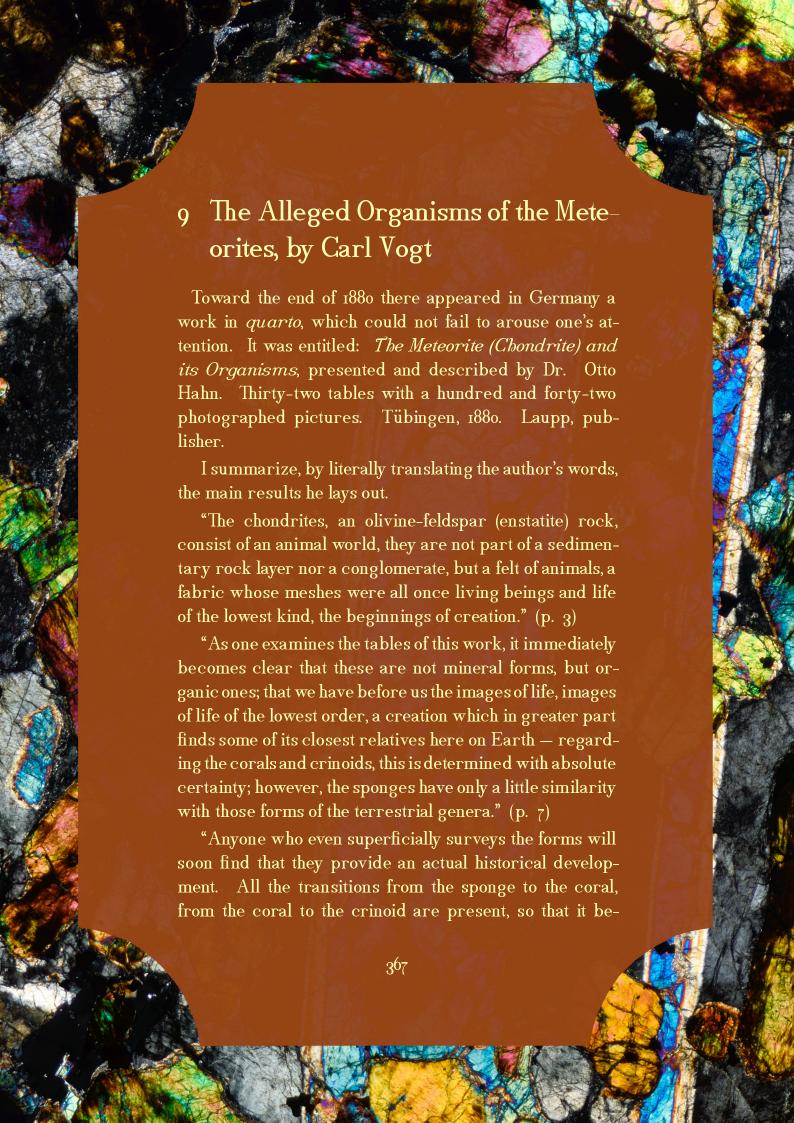


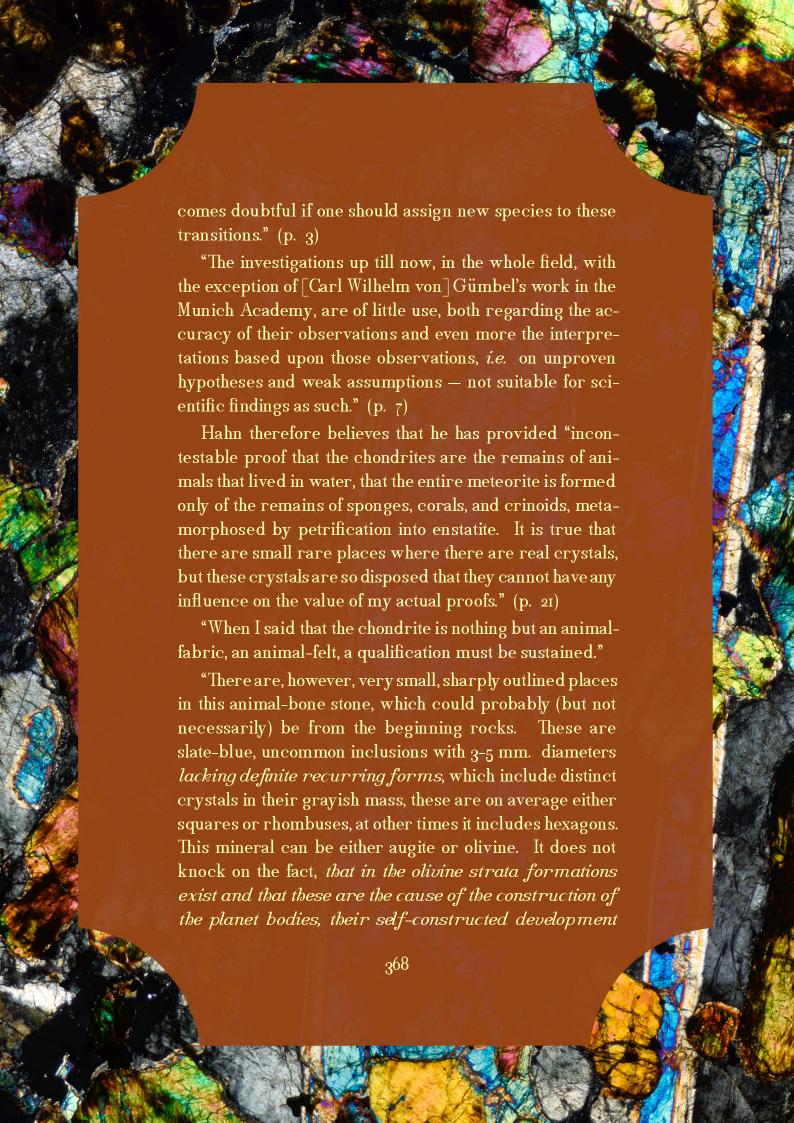


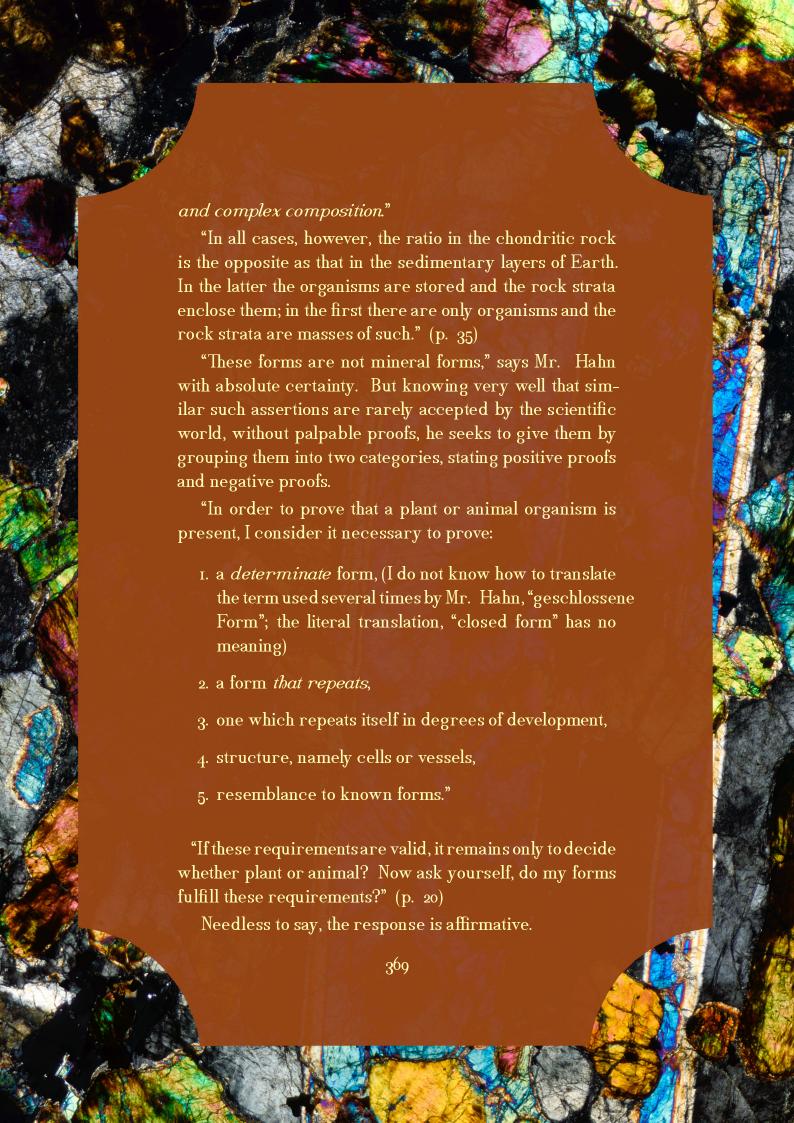




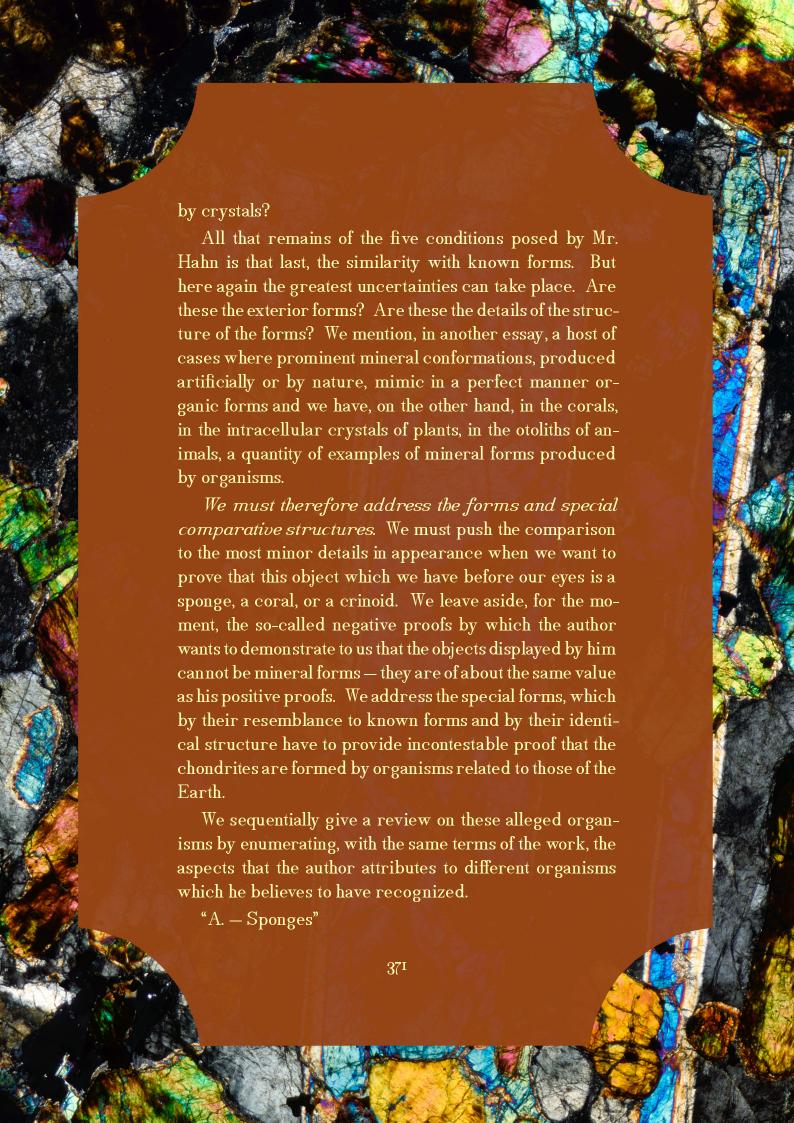


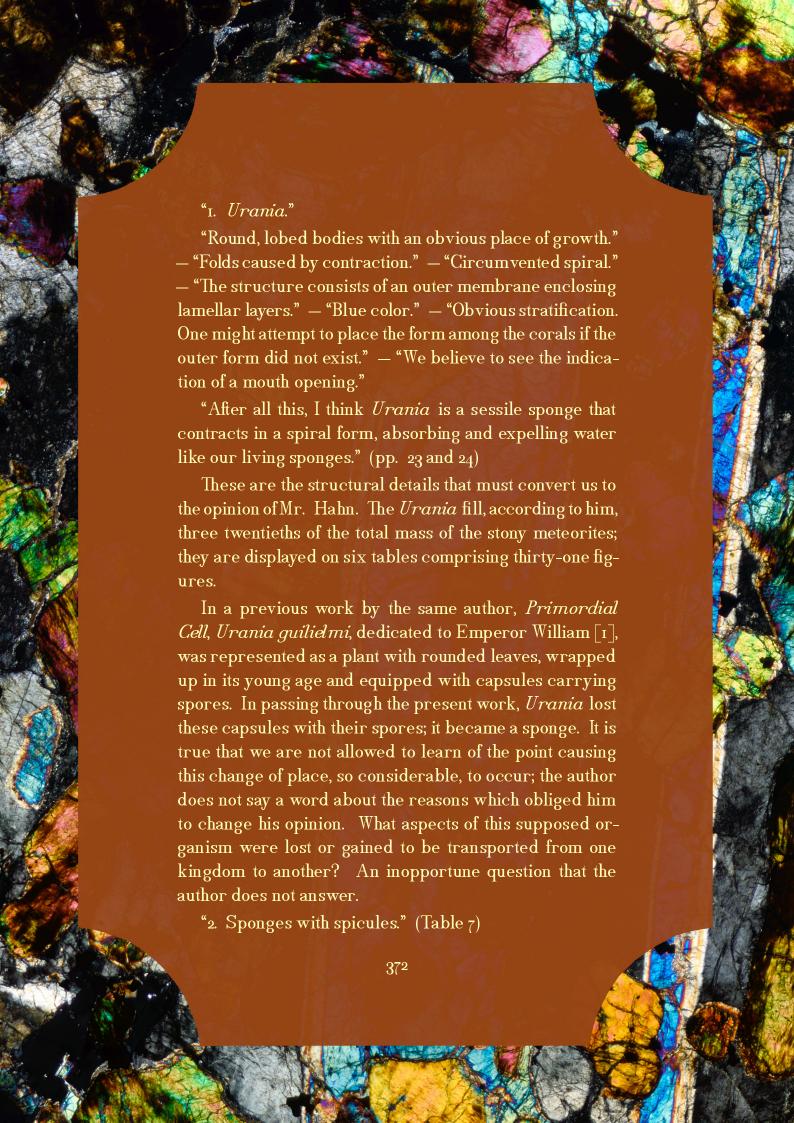


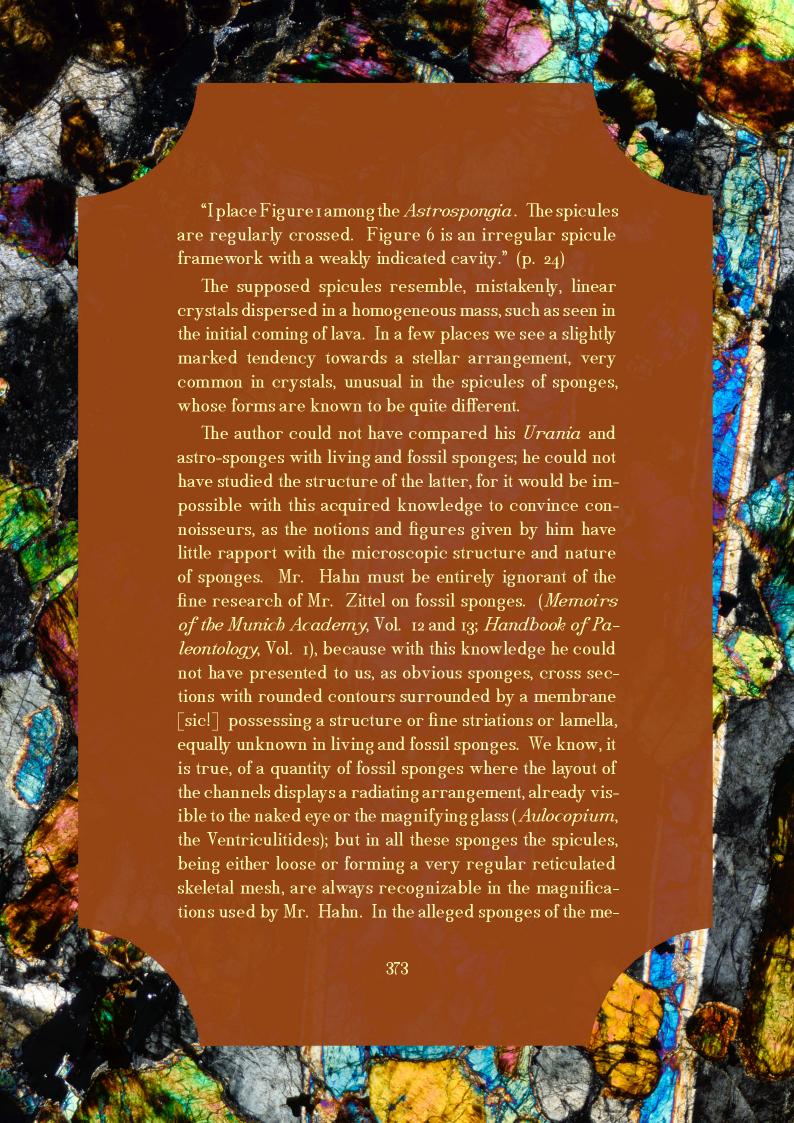








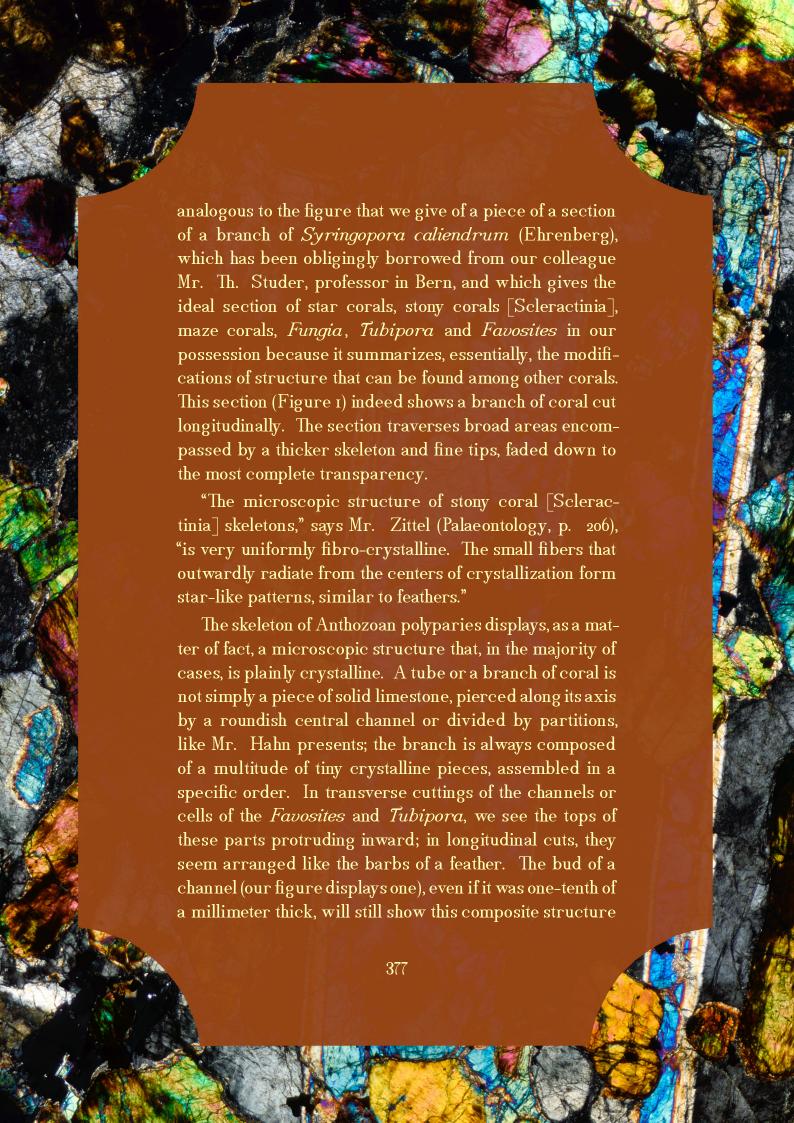




teorites there does not exist any trace whatsoever of this characteristic skeleton. We also know from Mr. Zittel's research the conditions under which, by the pseudomorphosis of siliceous sponges in limestone and that of calcareous sponges in silica, the inner structure may be entirely or partly lost; but in these cases the indication of the channels equally disappears and there remain only amorphous masses without apparent structure, formerly called "petrosponges" but which have been entirely removed from this classification ever since Mr. Zittel made known their true primitive structure. Conclusions: The alleged sponges of the meteorites have neither the form nor the structure of known sponges. "B. — Corals" "Here we have such well-preserved terrestrial forms that not a doubt is left remaining." "Table 8 shows a sample image, Table 9 its channel structure: obvious bud channels that are tubular connections (for there are such). In addition, there is the curvature of the channels, which absolutely cannot be mistaken for a sheet breakage, plus there is the very clear tube openings and finally an equally clear growth site. The bud channels are 0.003 mm. apart. Of course, everything you can ask for from a Favosites structure." "In Table 11 any researcher will easily recognize the image of living coral forms, the more so as the cup shape (cavity) is indicated in Figure 1 above. The same object also shows the cross partitions of the tubes, which clearly emerge." (Unfortunately, I fail to see in this figure any indication of a cavity, tubes, or transverse partitions.) 374







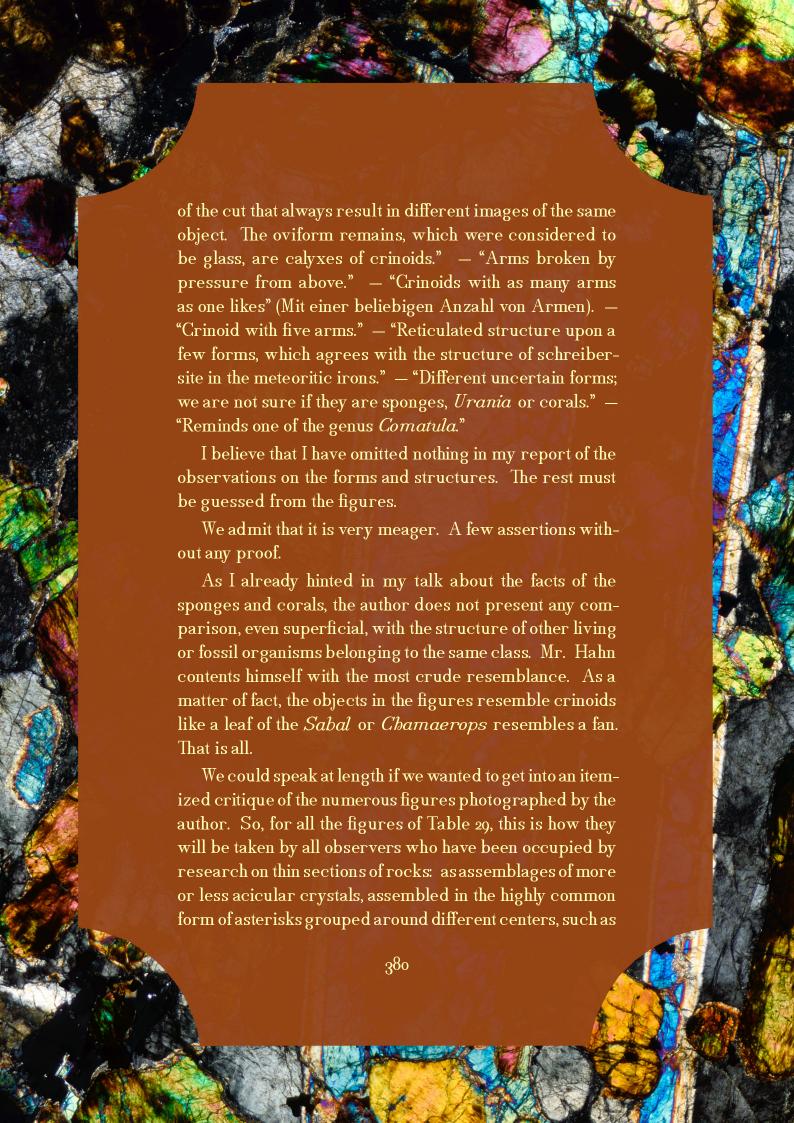


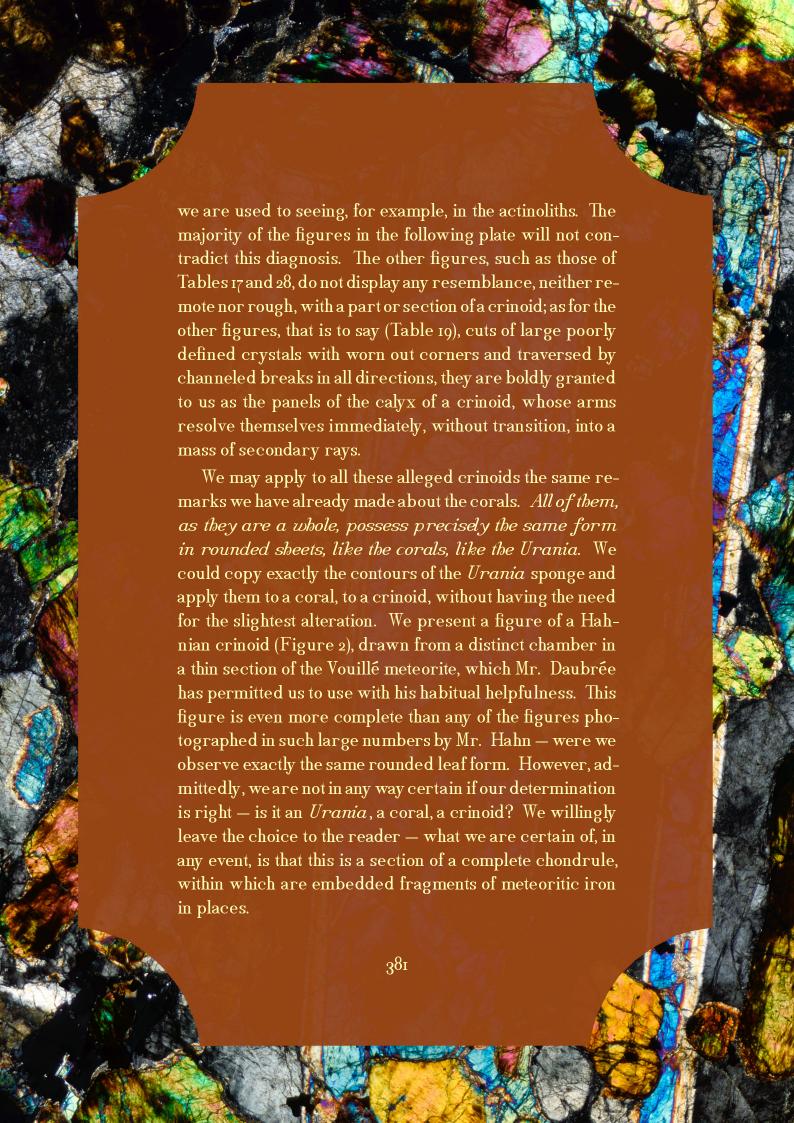
There is therefore not a single similarity between the alleged corals of Mr. Hahn and genuine corals, such as we know them from the various formations in the most ancient strata of the Earth. There is not even a similitude with the external forms, because the tubiform cells of *Favosites* are distinctly polygonal and pierced by holes on their wall, and the entire polyp is either loosely branched or very organized in a thick mass. We arrive at the final class, representing, according to Mr. Hahn, most of the chondrules of the meteorites and that themselves make up, according to the author, sixteentwentieths of the total mass. It is the class or even, if you will, the phylum of Echinoderms, represented by the crinoids.

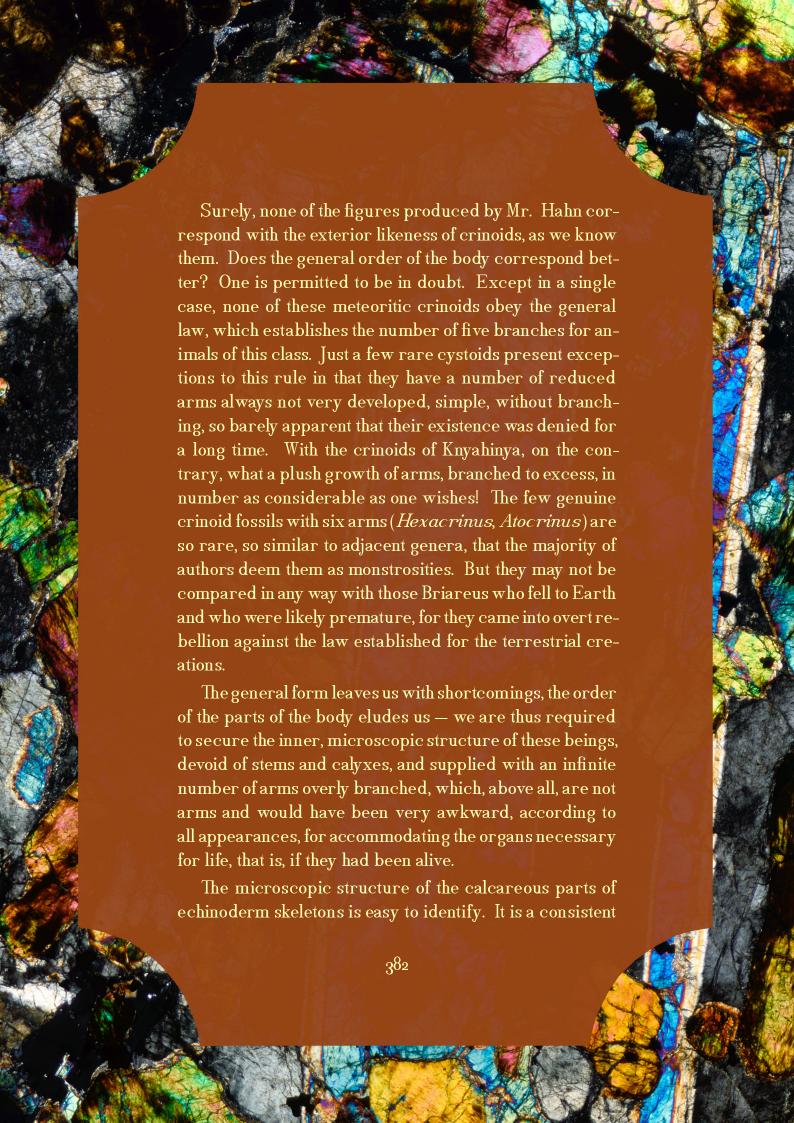
Studied with preference by our author, this type did not provide fewer than sixty-six figures. Here, we will undoubtedly come across a more ample yield of facts and observations. The structure of the crinoids is complicated; their forms are quite varied; study offers plenty of difficulties, on which the sagacity of the observer can be applied. Given the multitude of specimens found within the meteorite of Knyahinya alone, the bottom of the planetary sea, from which the aerolites originate, must have resembled a submarine crinoid forest, an occurrence known from the dredging of modern expeditions.

"C. — Crinoids"

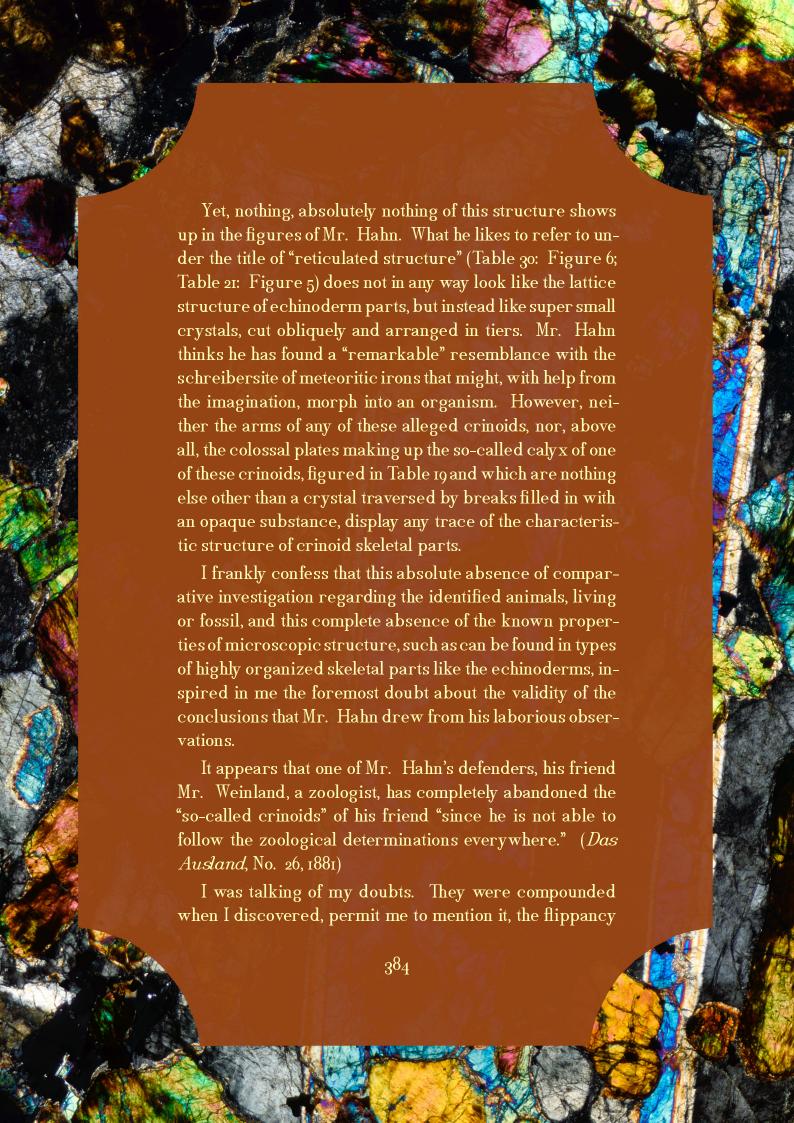
"They are found from the most simple form of an articulated arm to complete crinoids with stem (we have searched in vain for a stem in the figures), with calyx, main and auxiliary arms. The conservation is ordinarily good. The difficulty comes with the thousands of directions

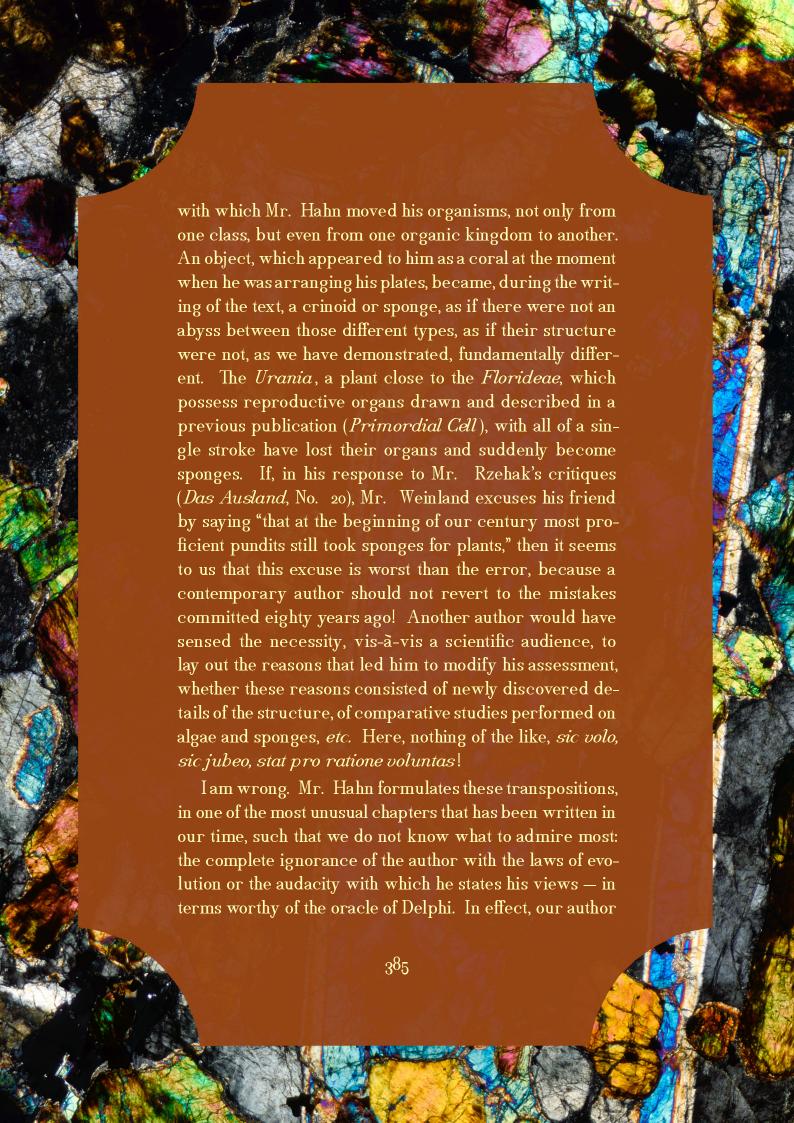


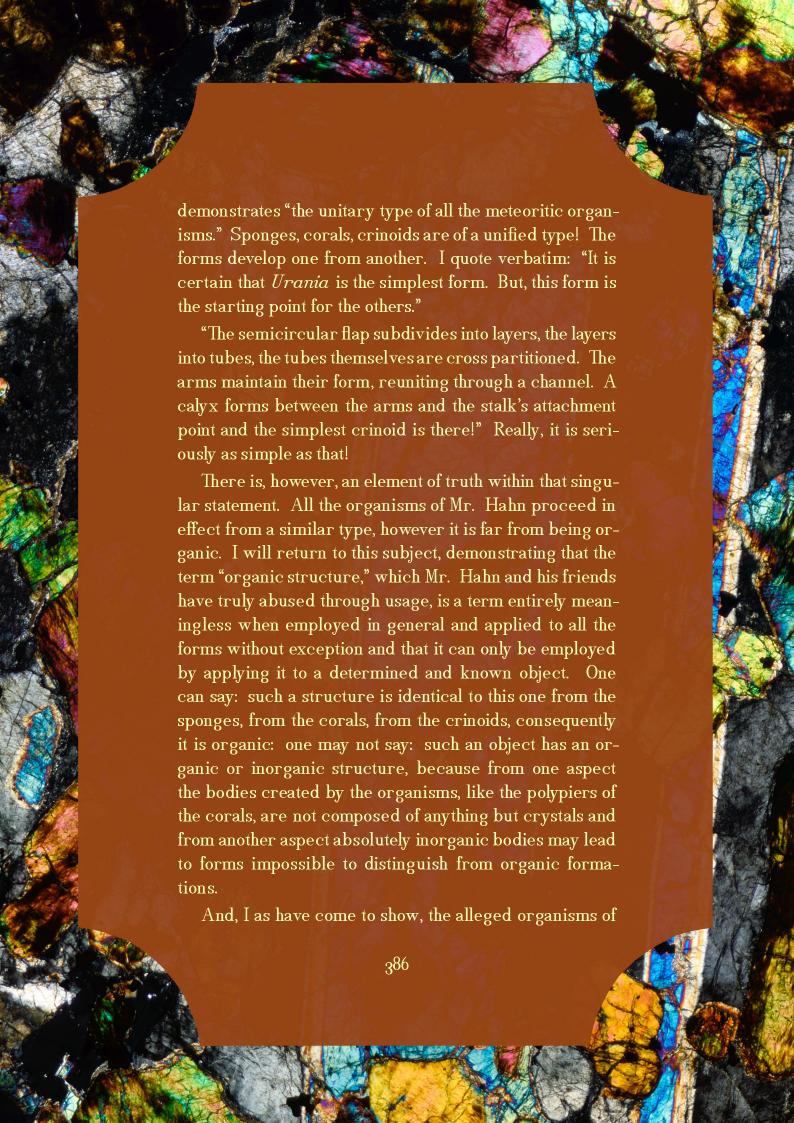


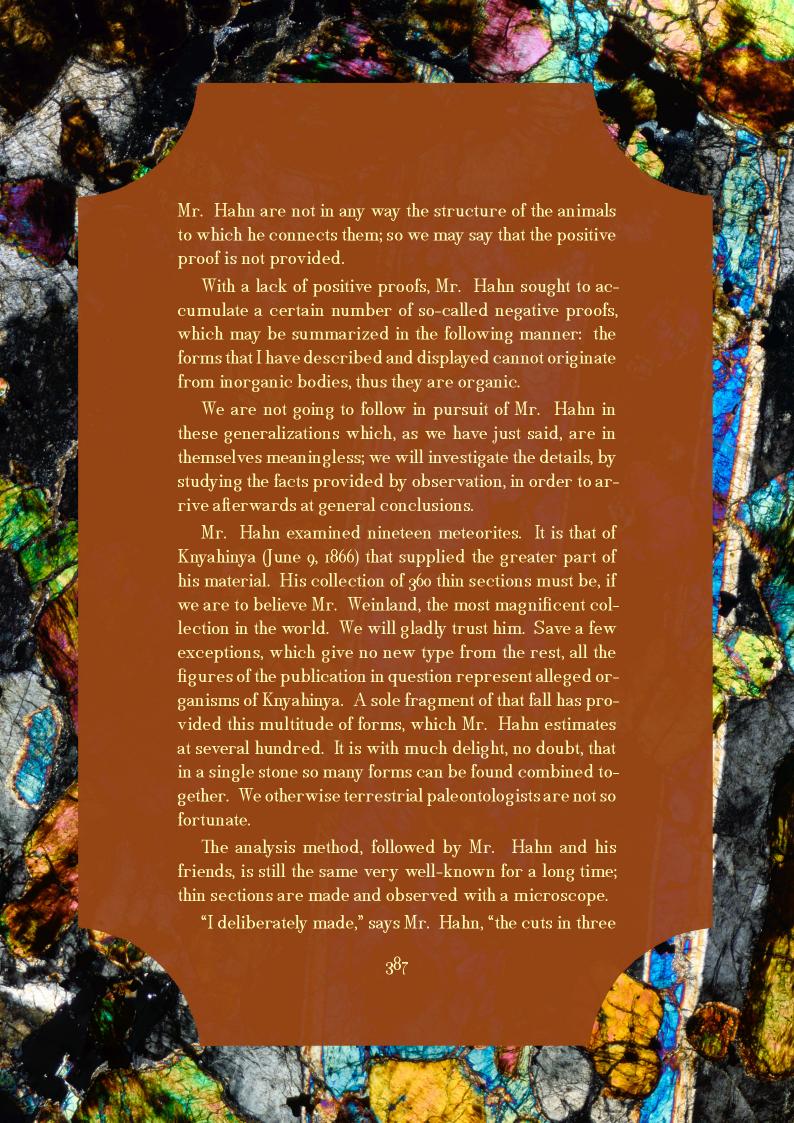


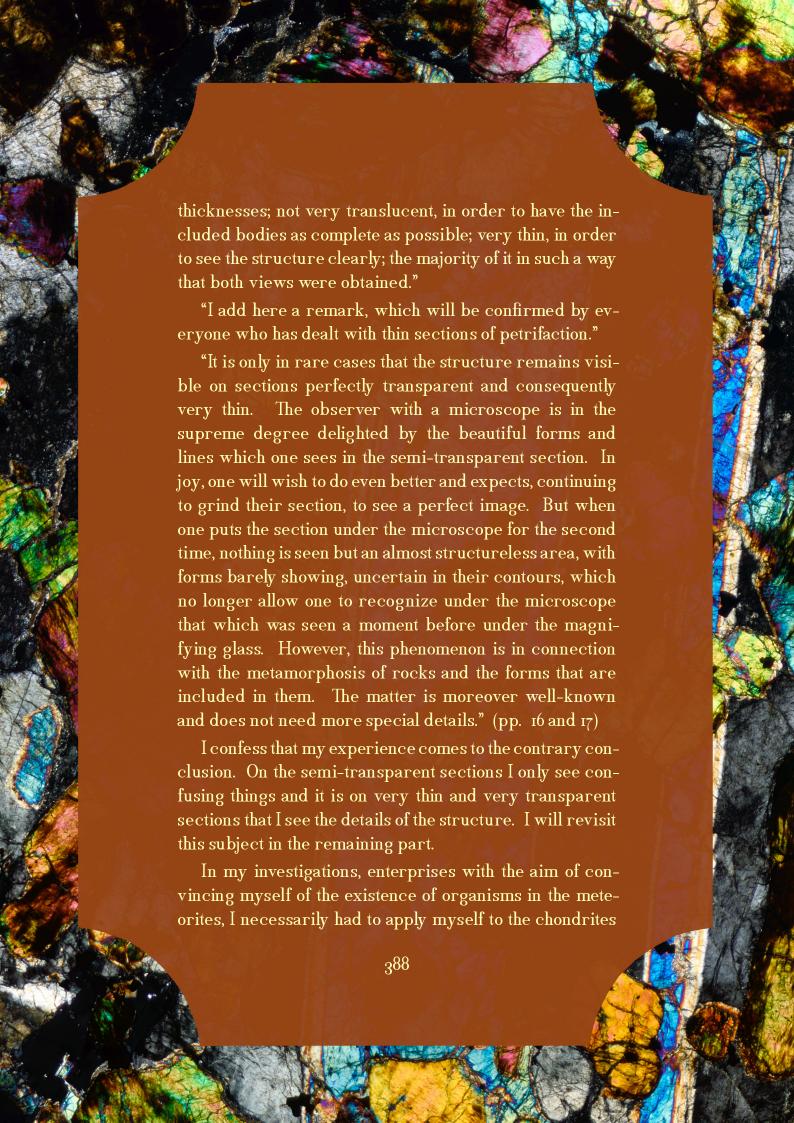


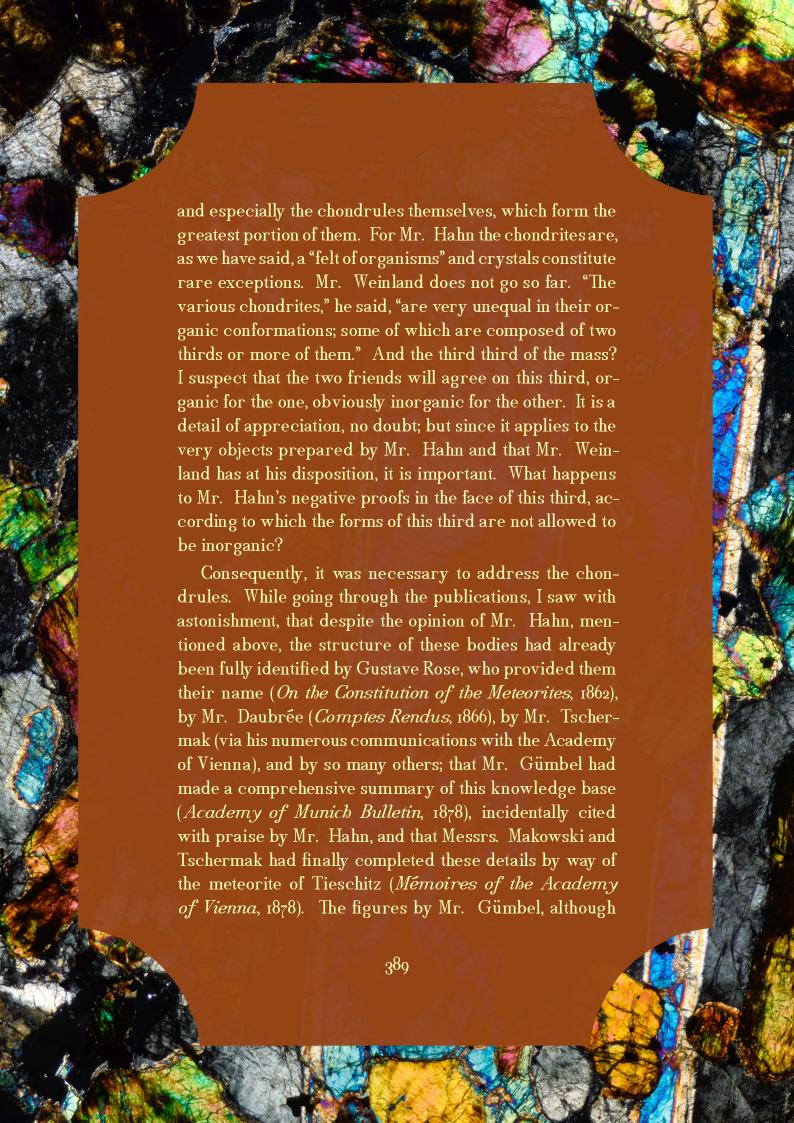


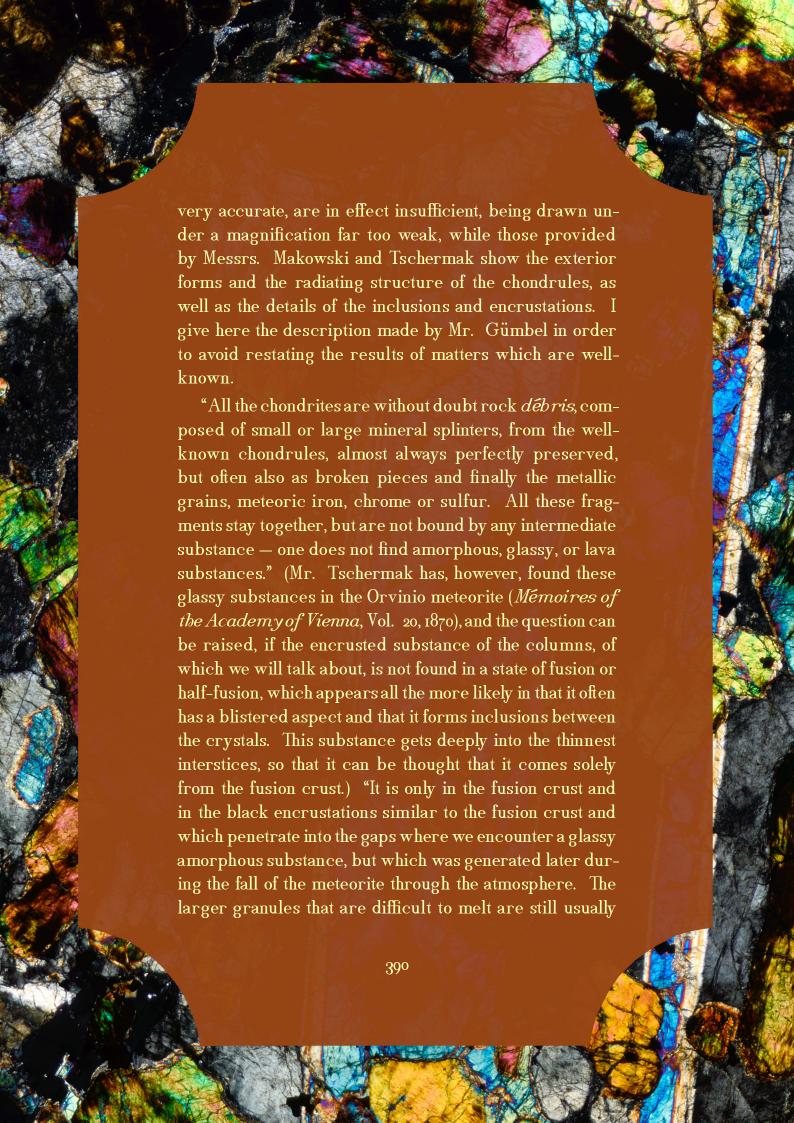


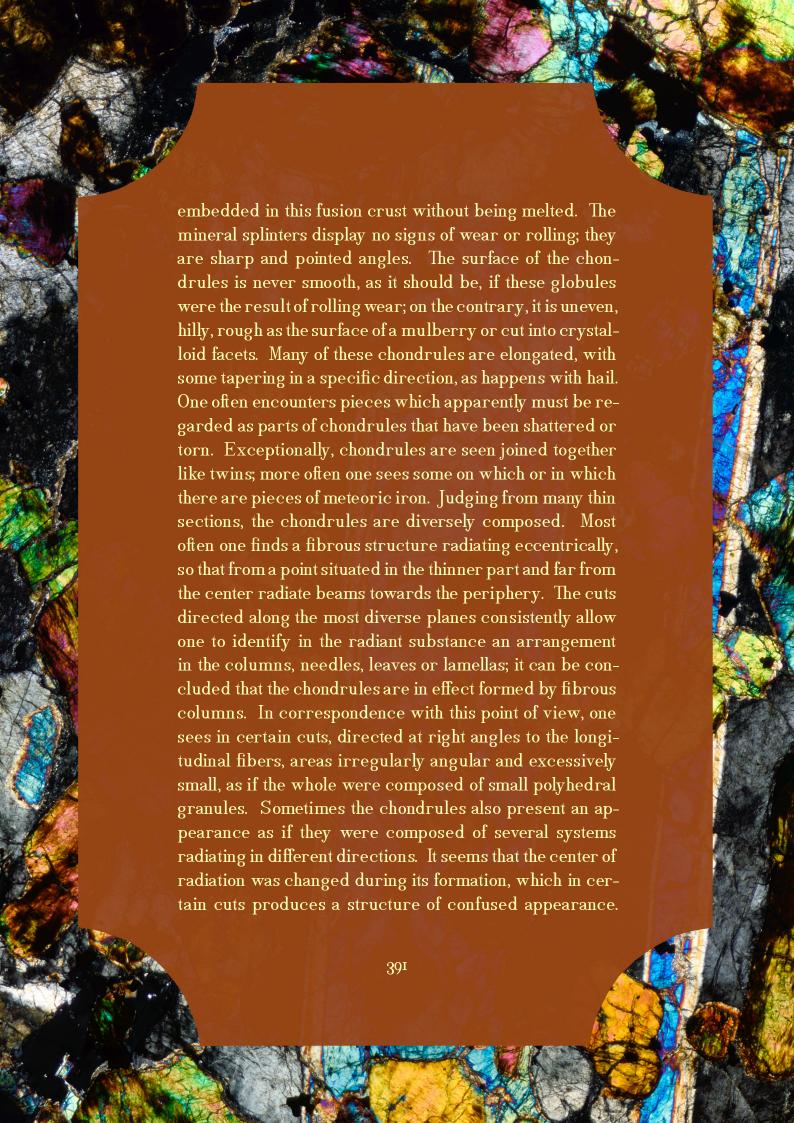


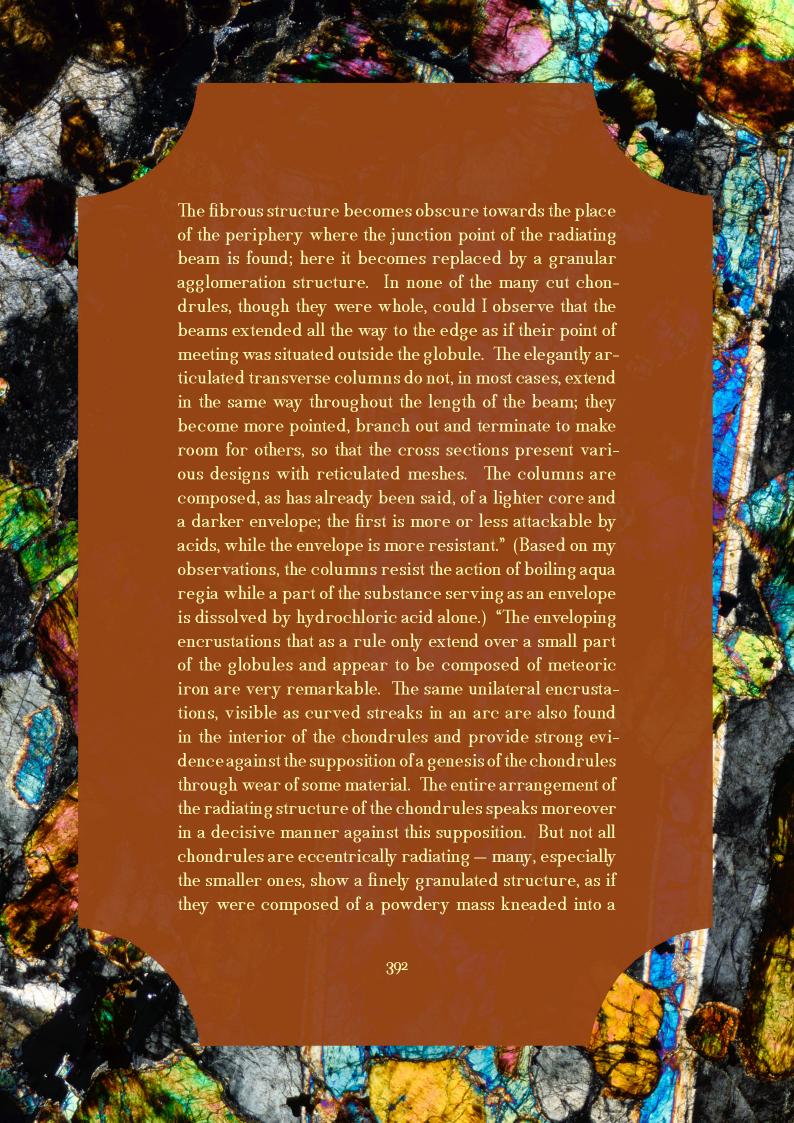


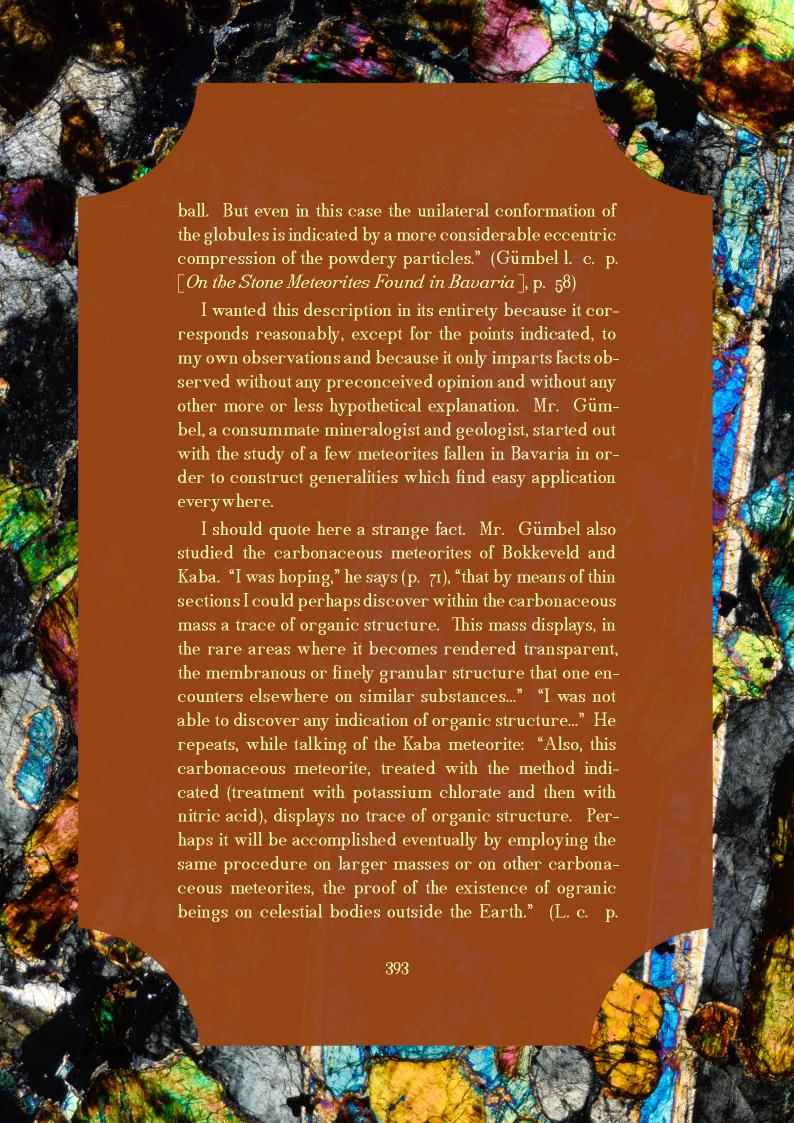


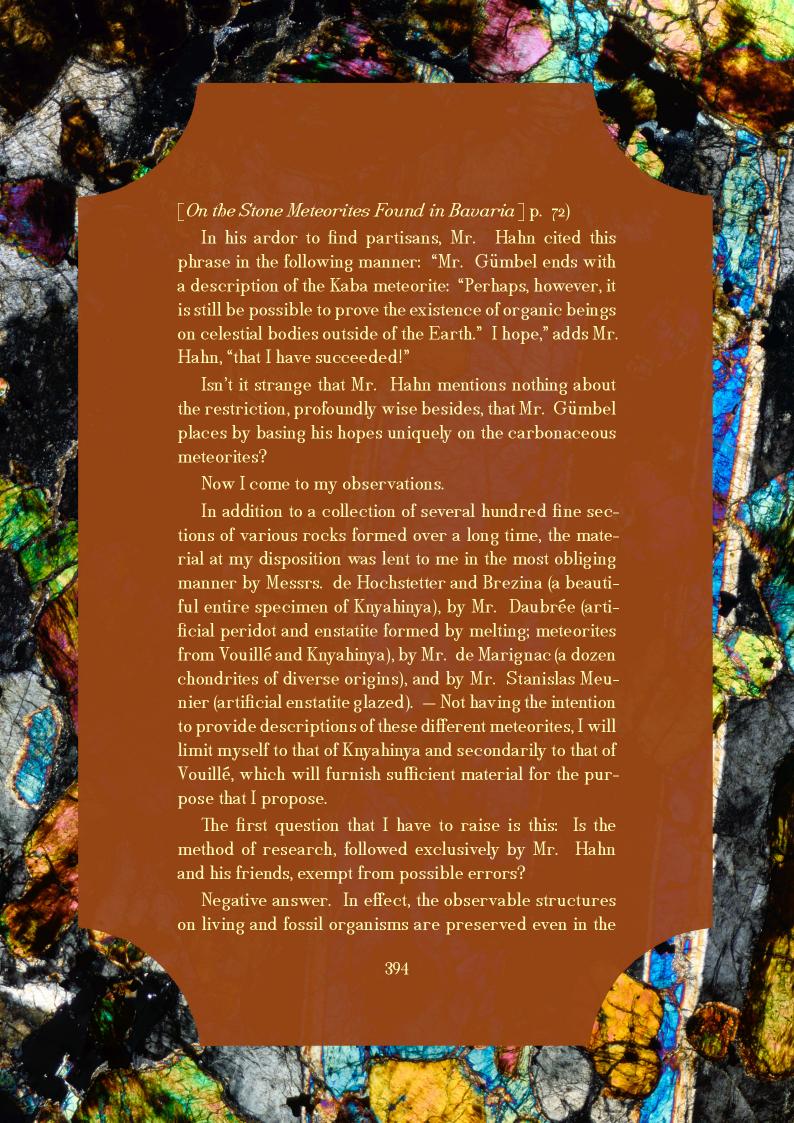


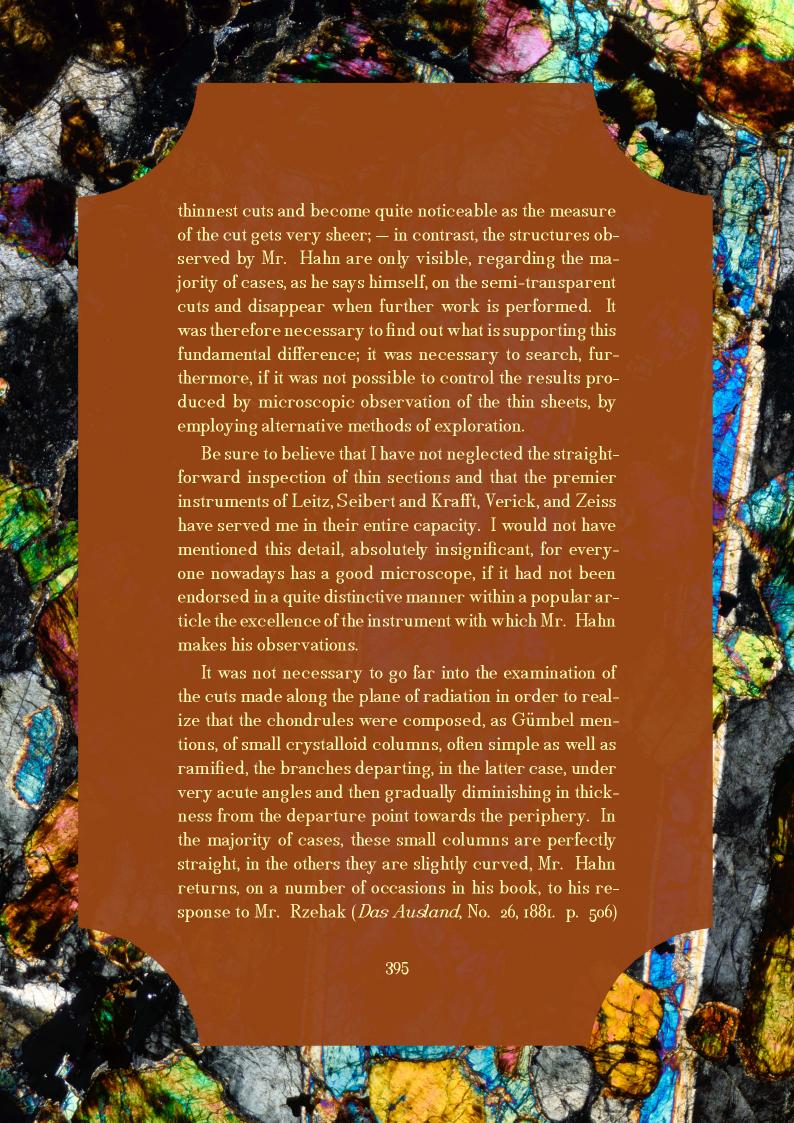


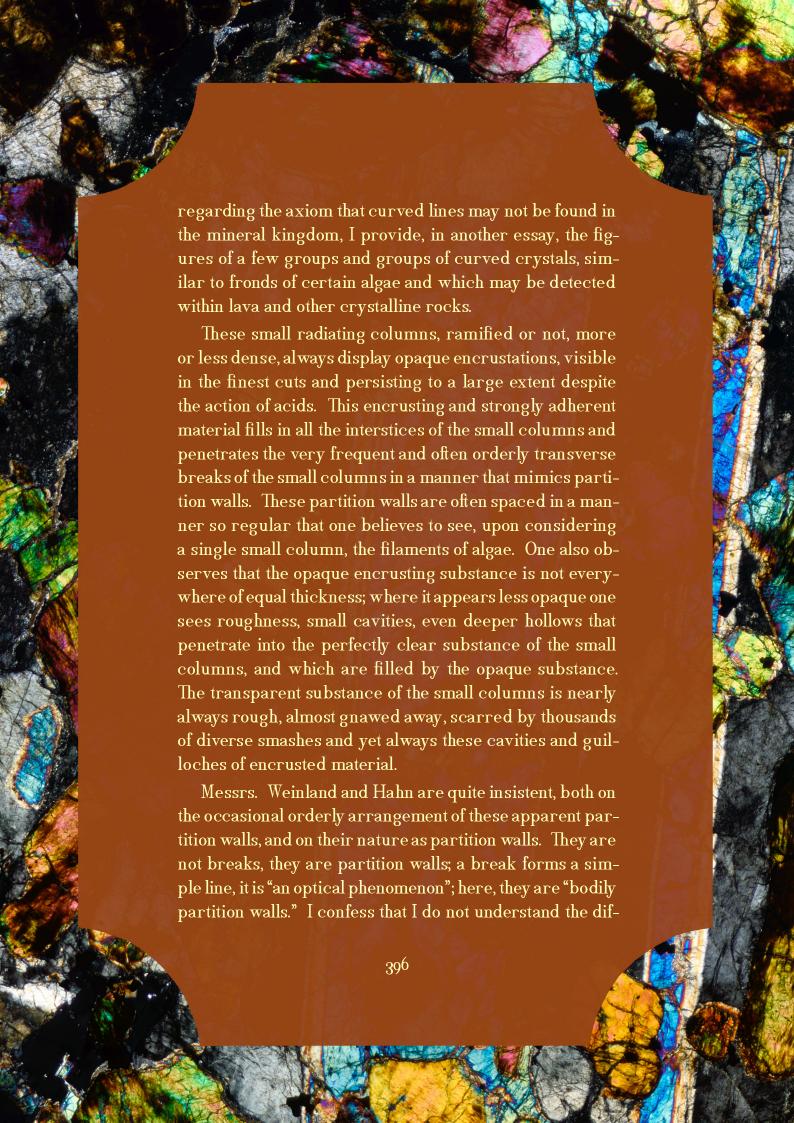


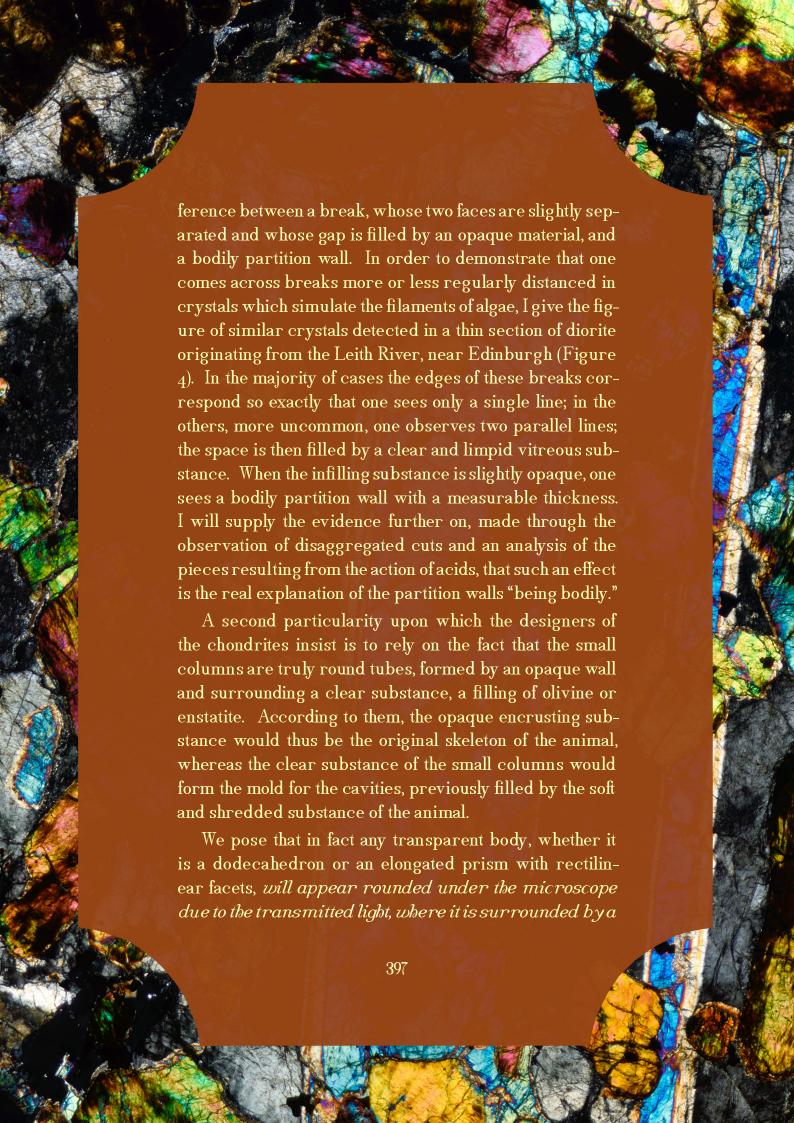




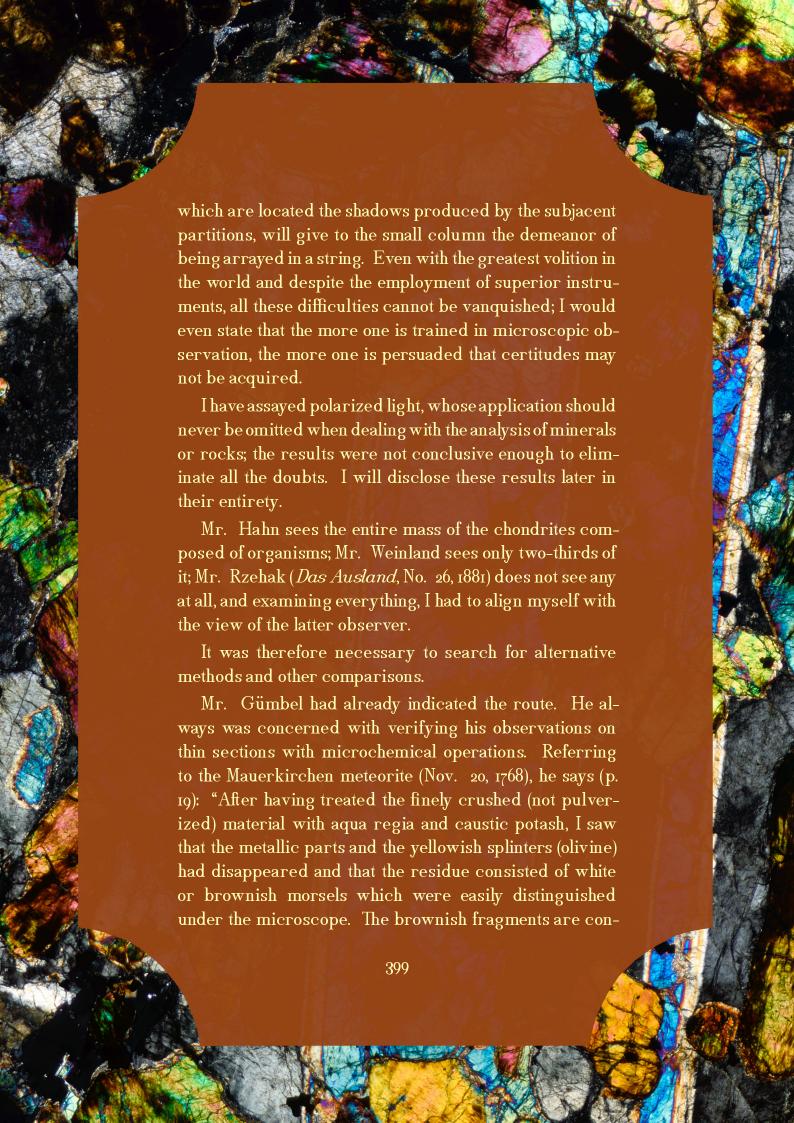




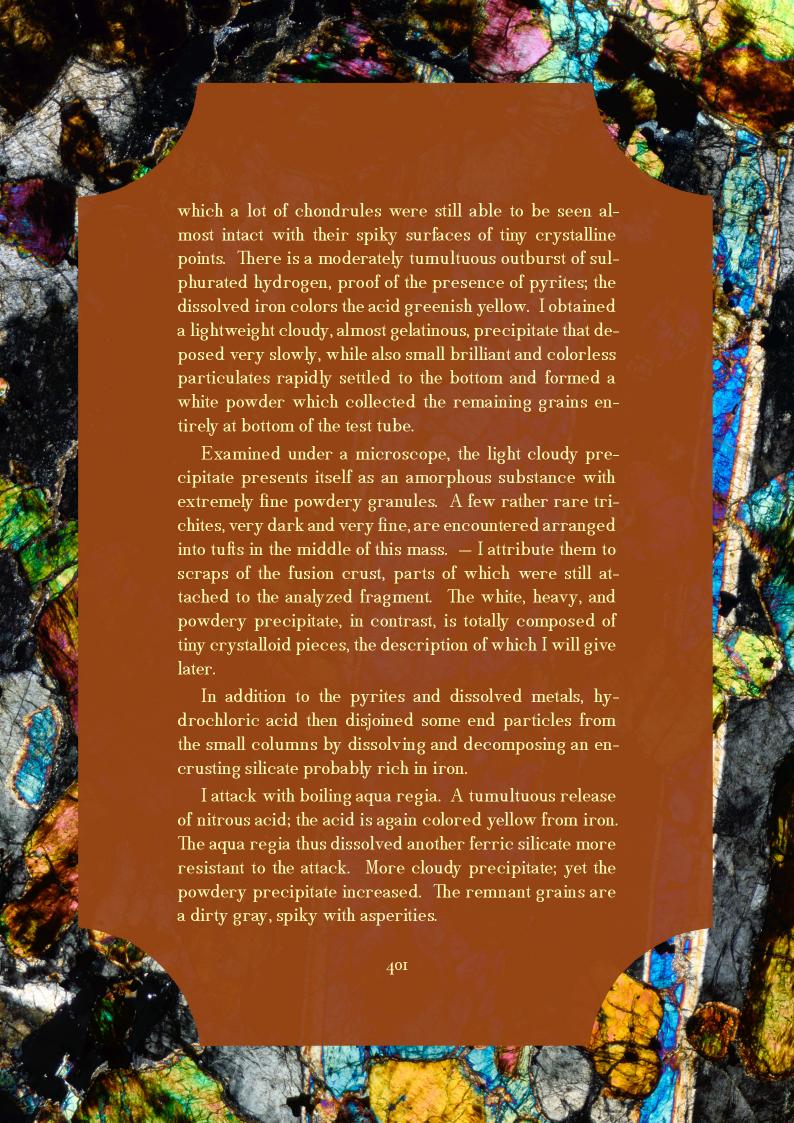


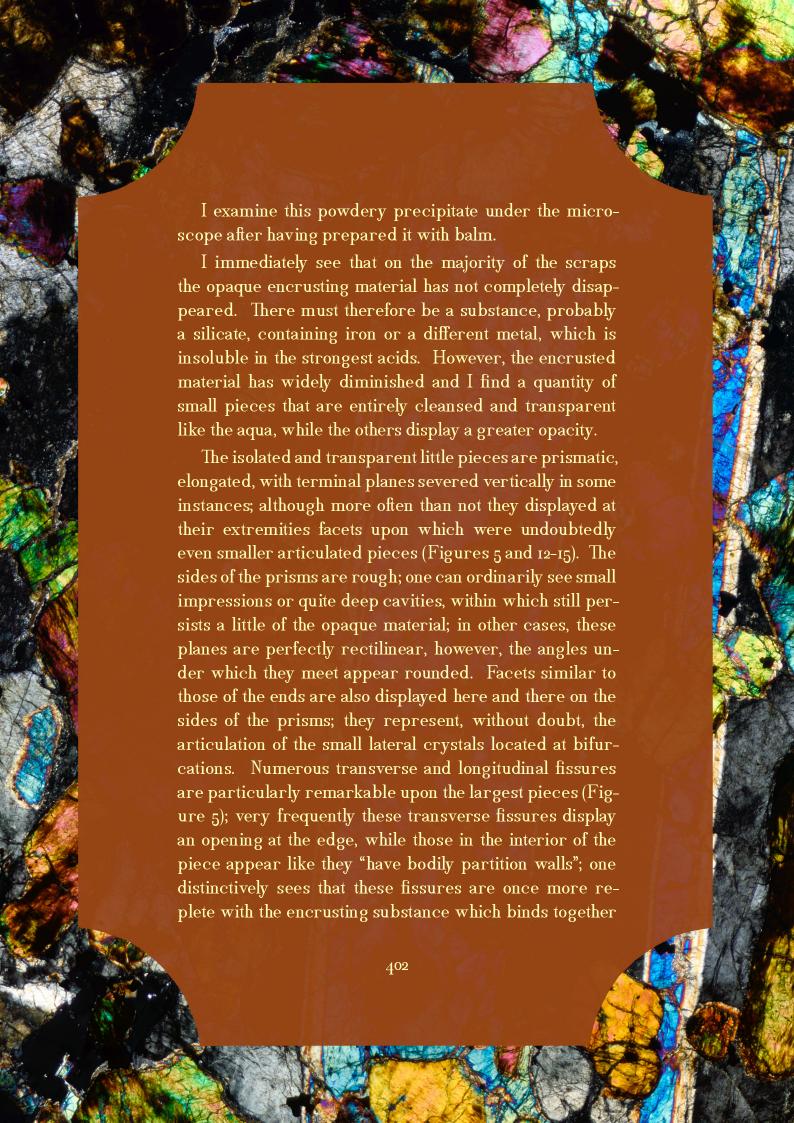


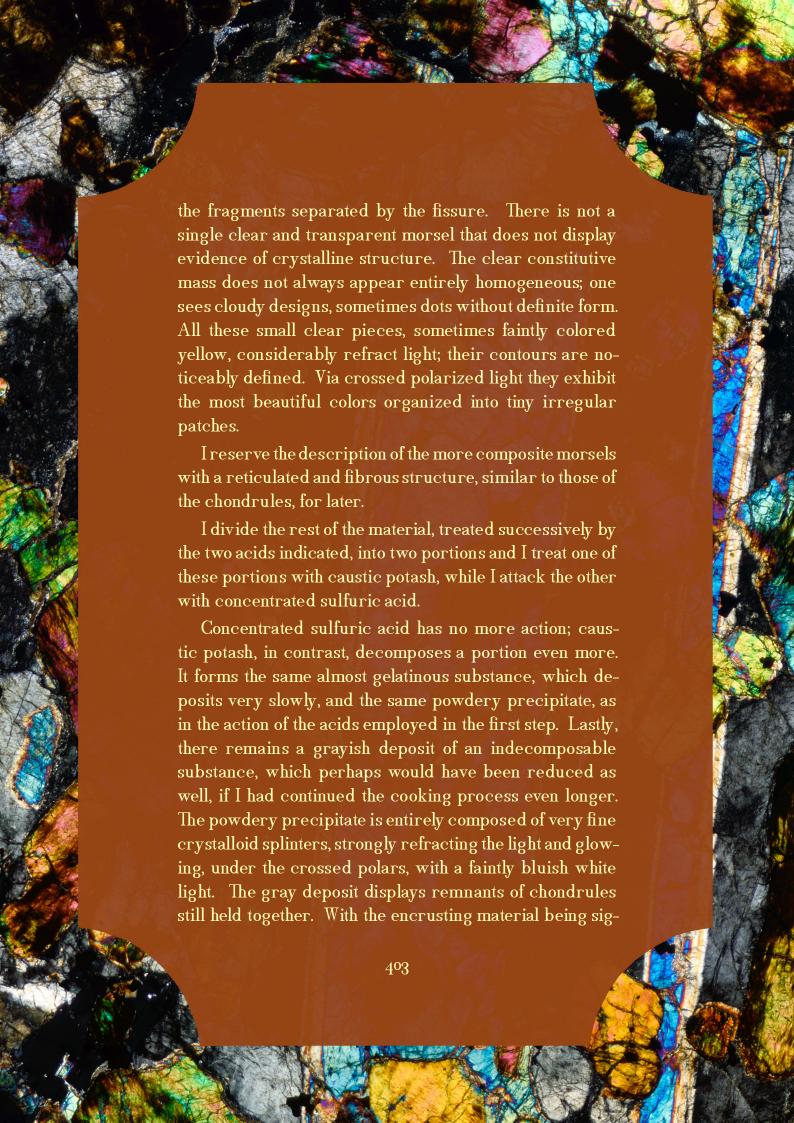


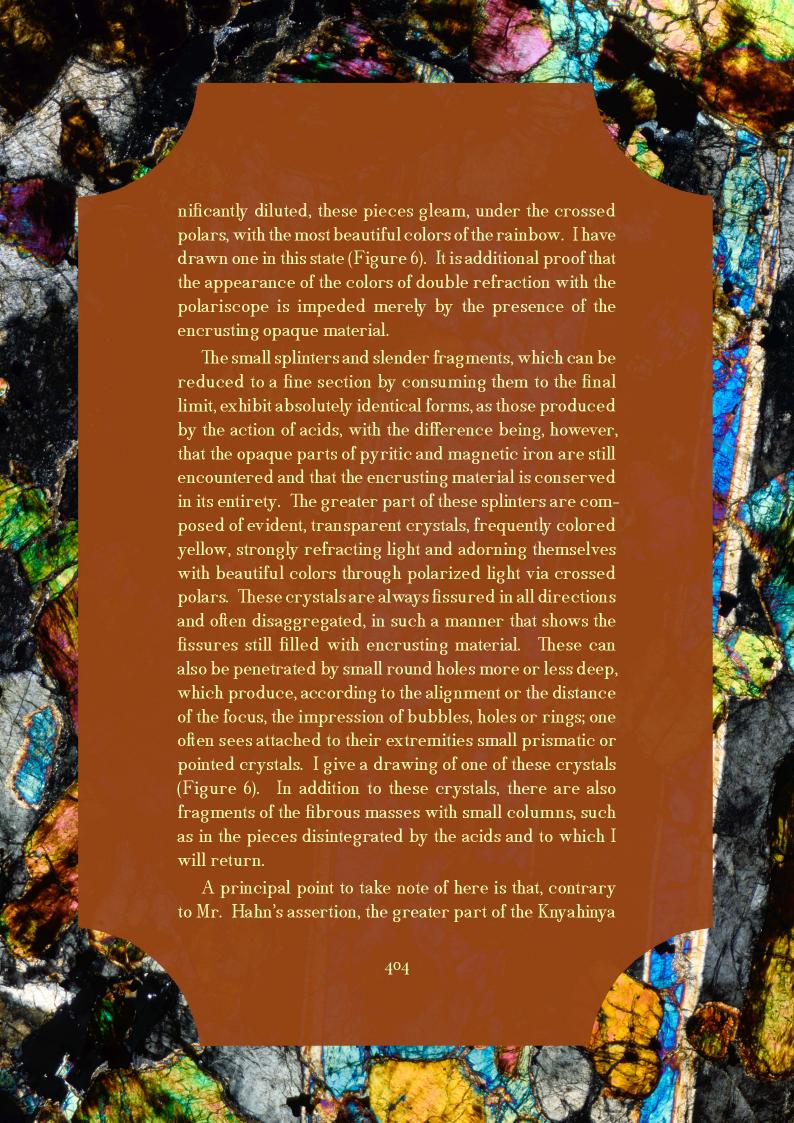


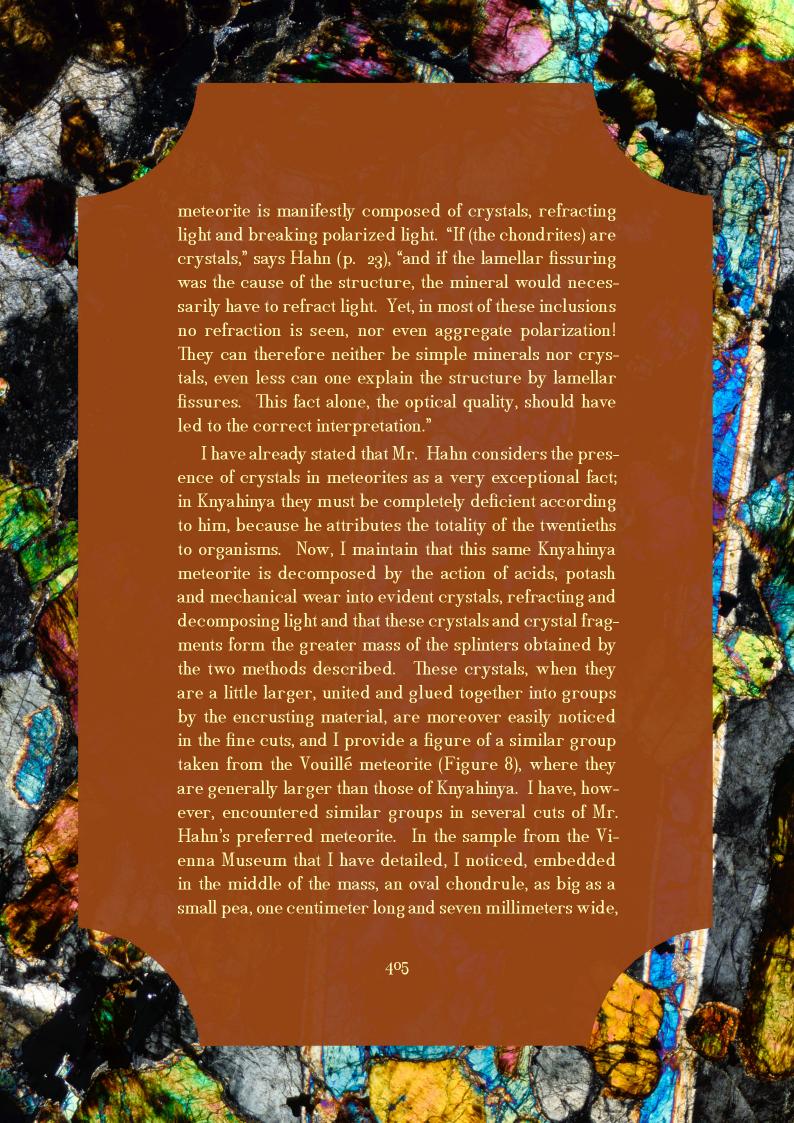






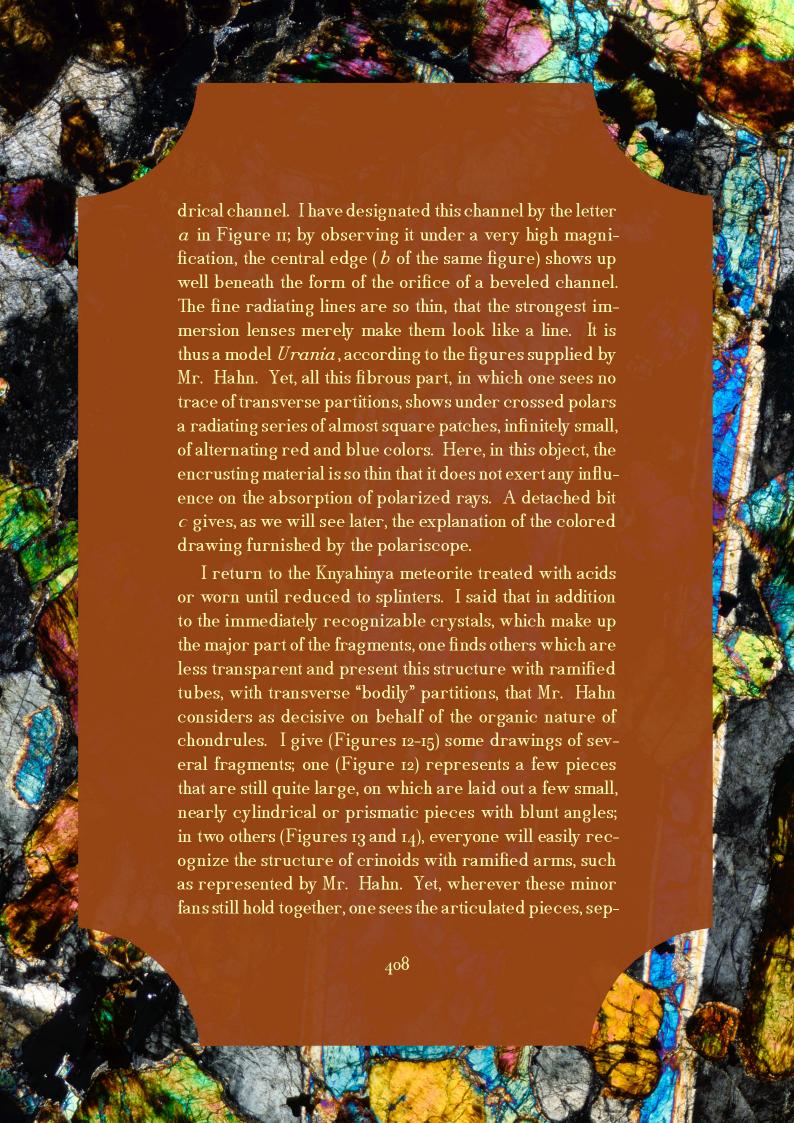




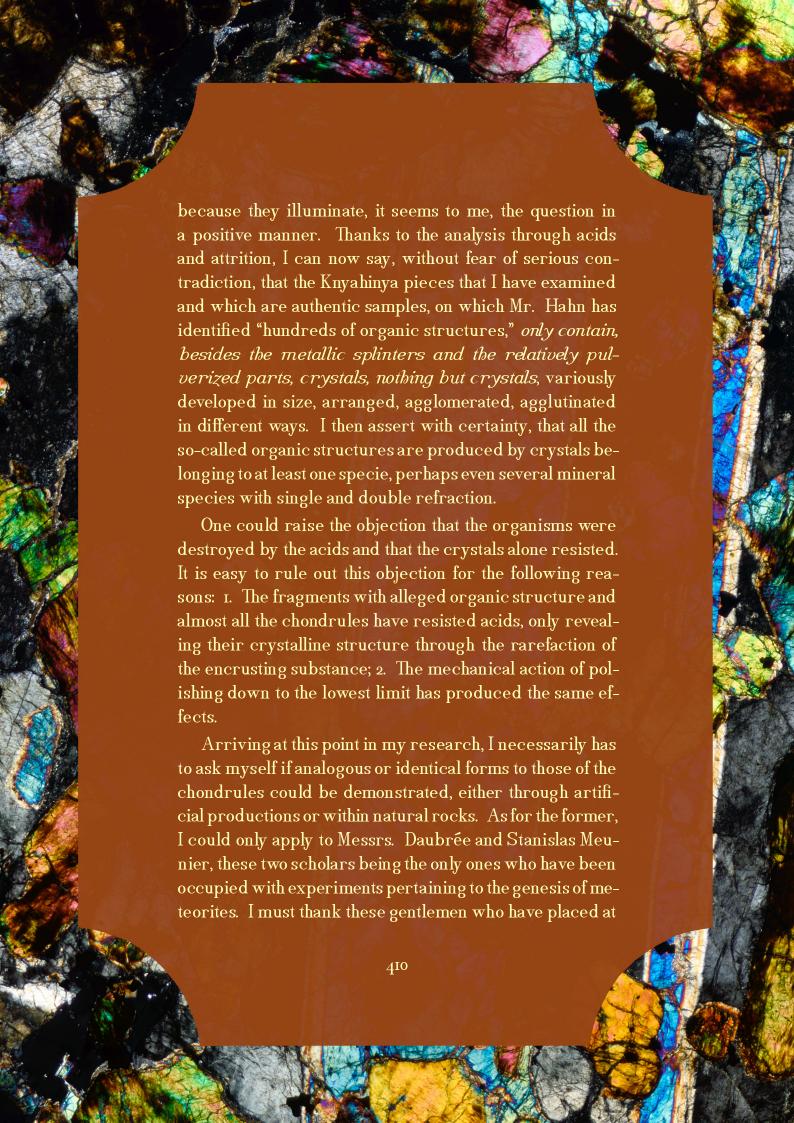


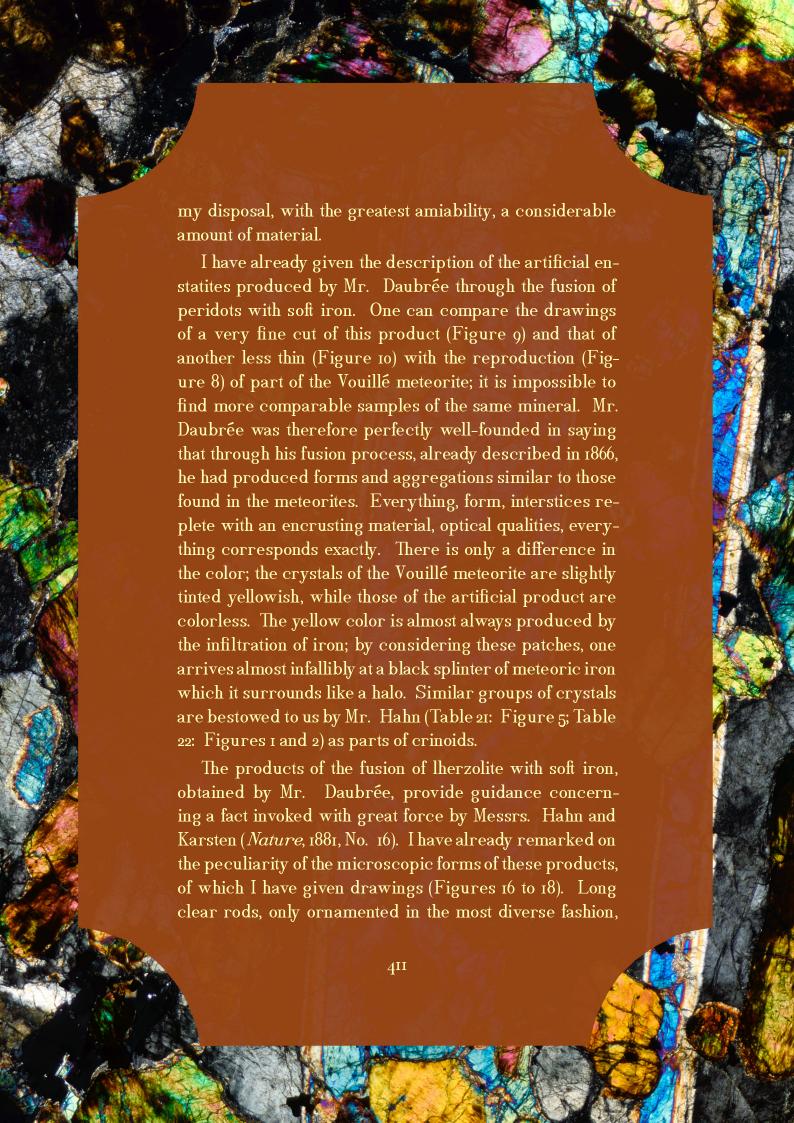


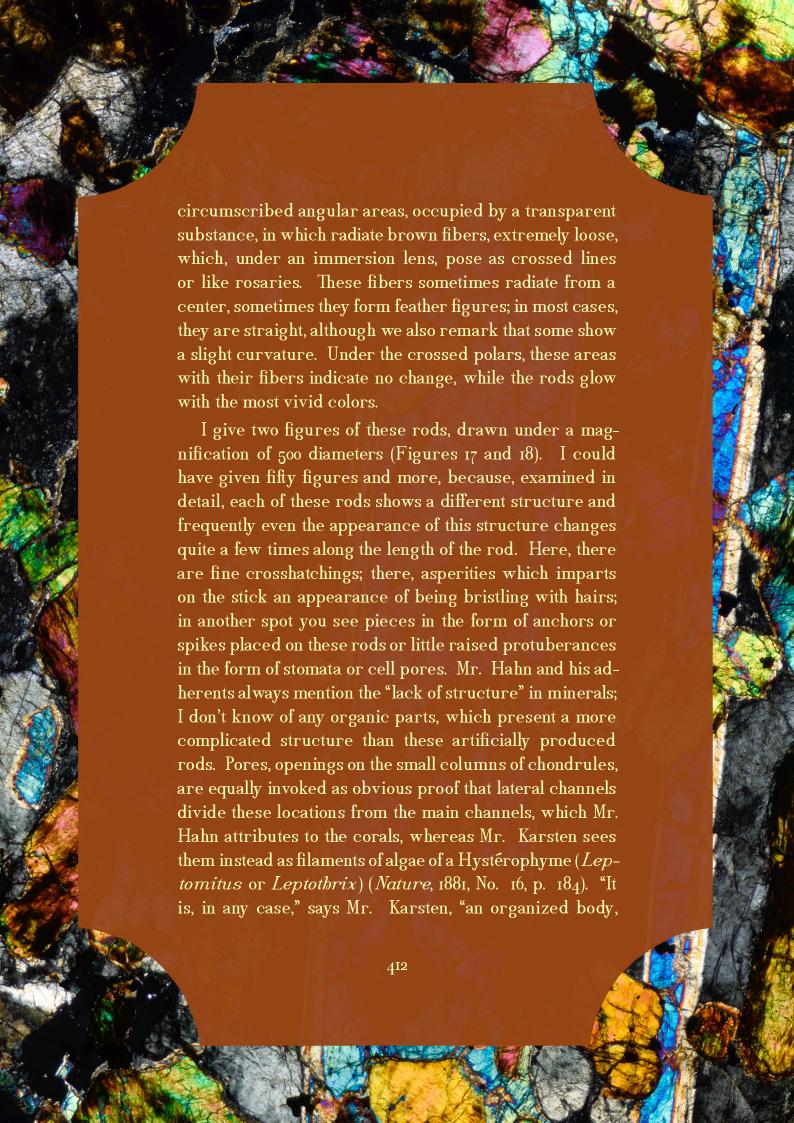


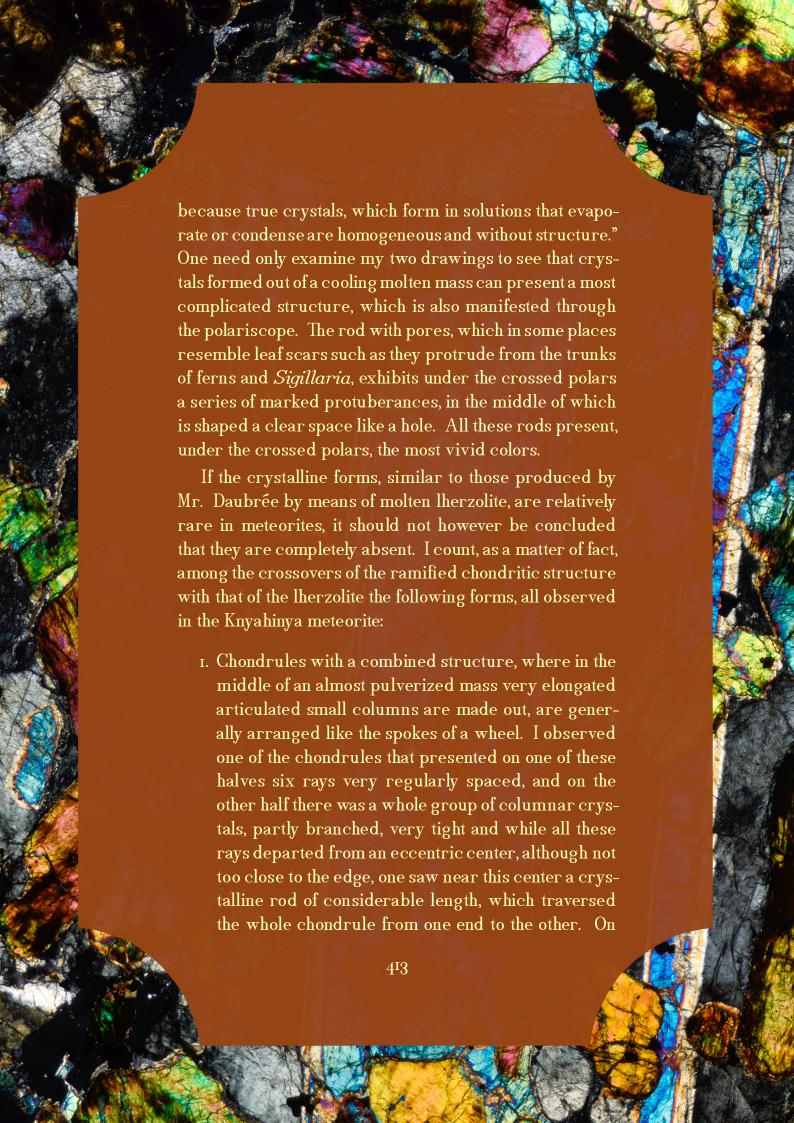


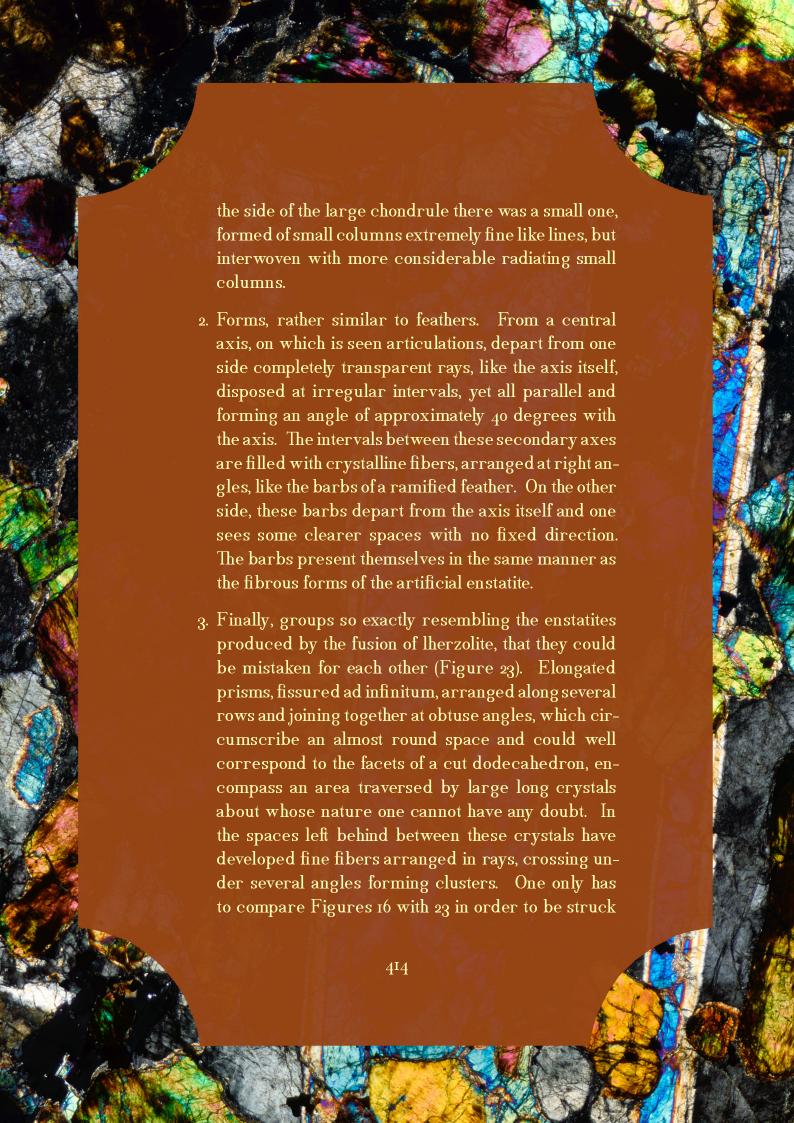


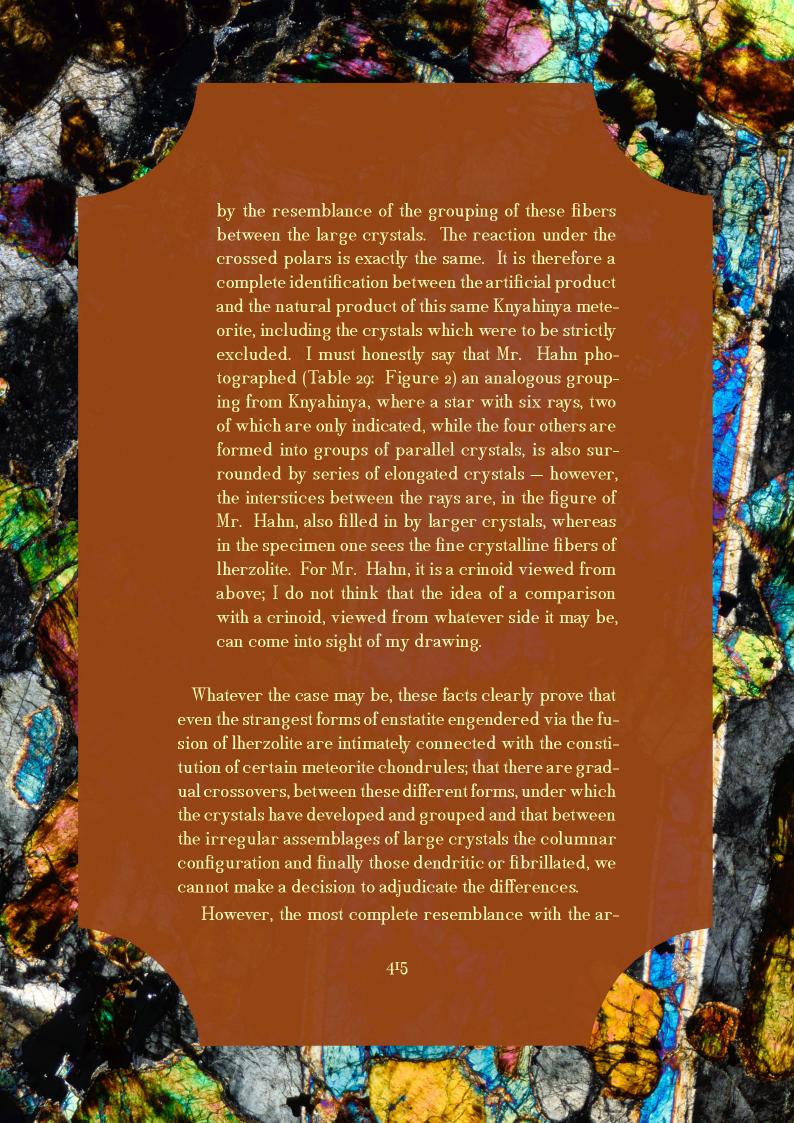


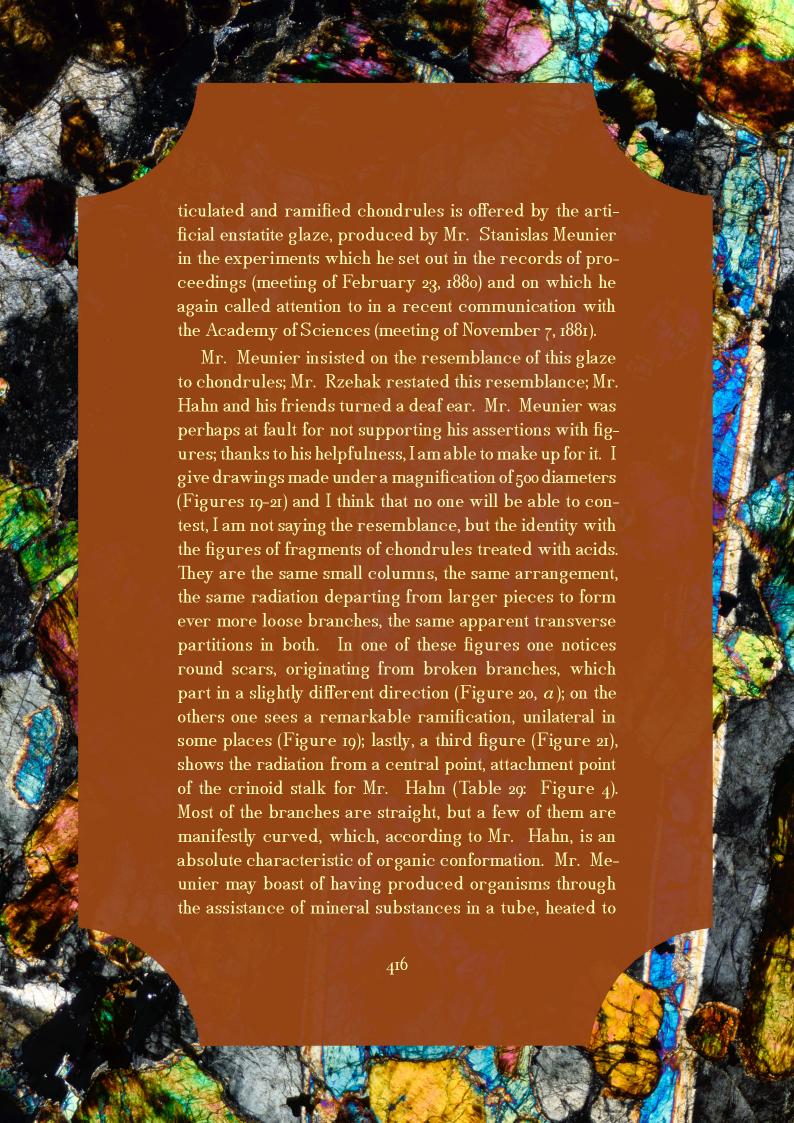


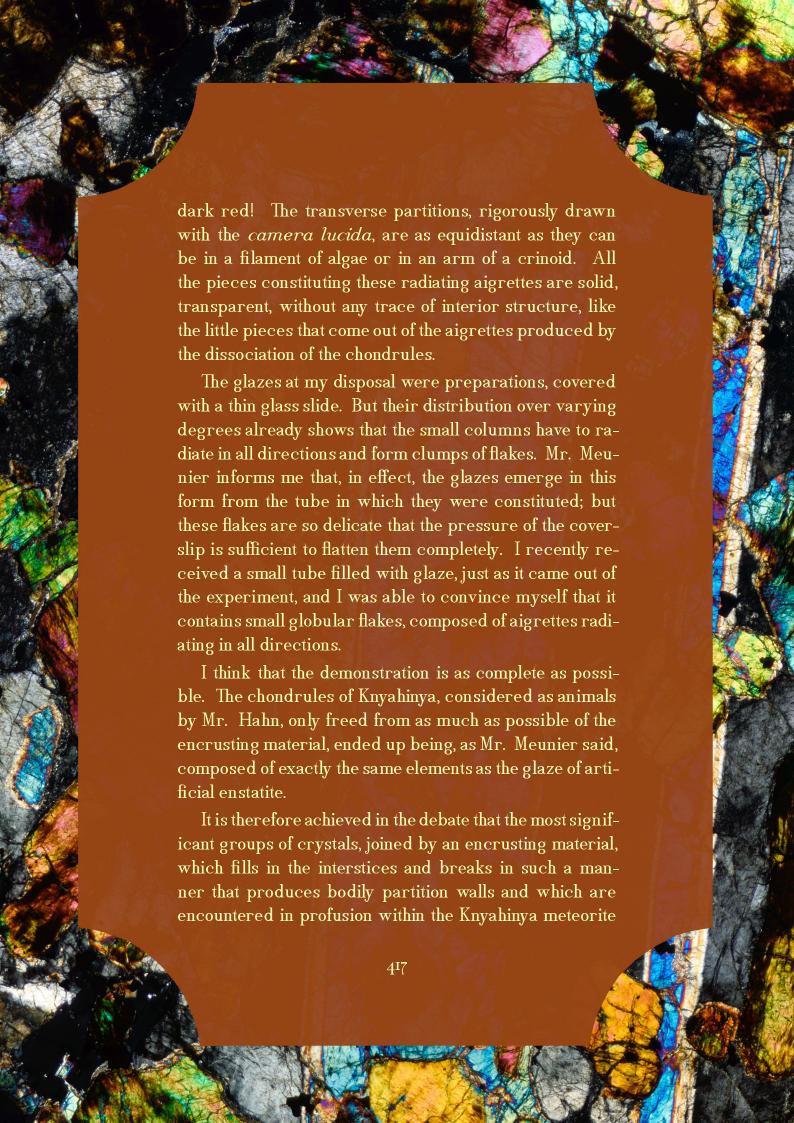


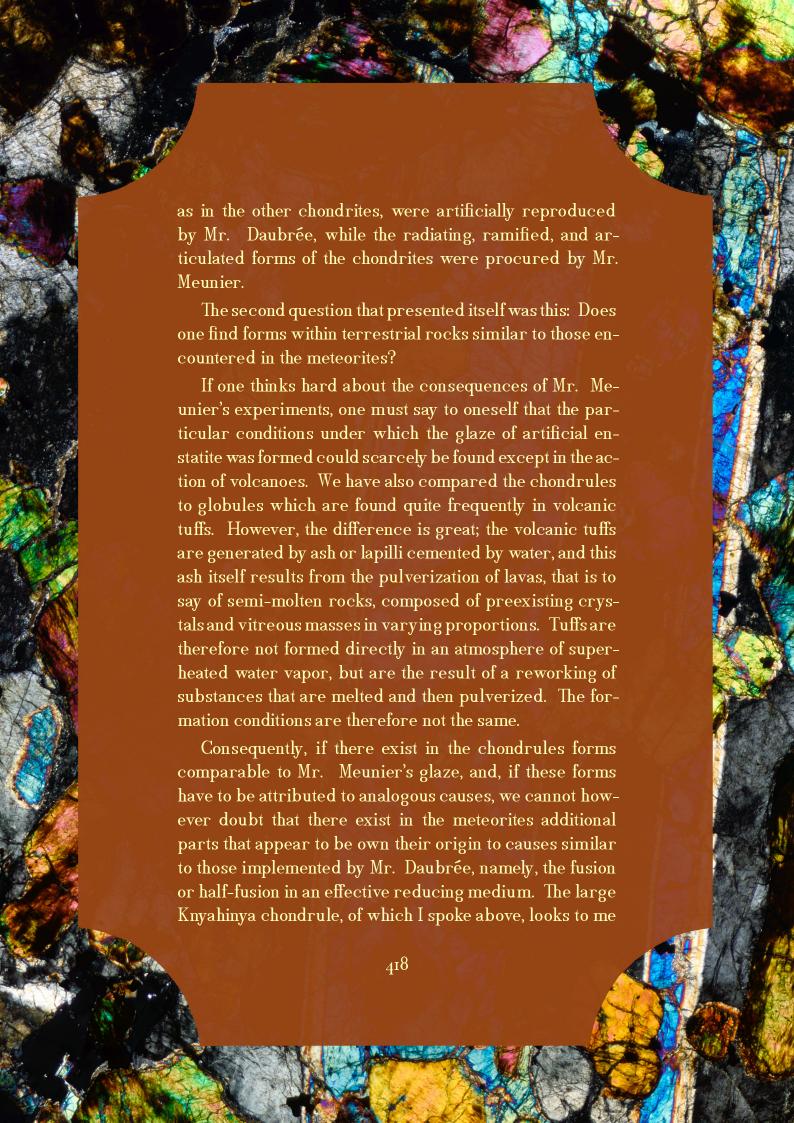








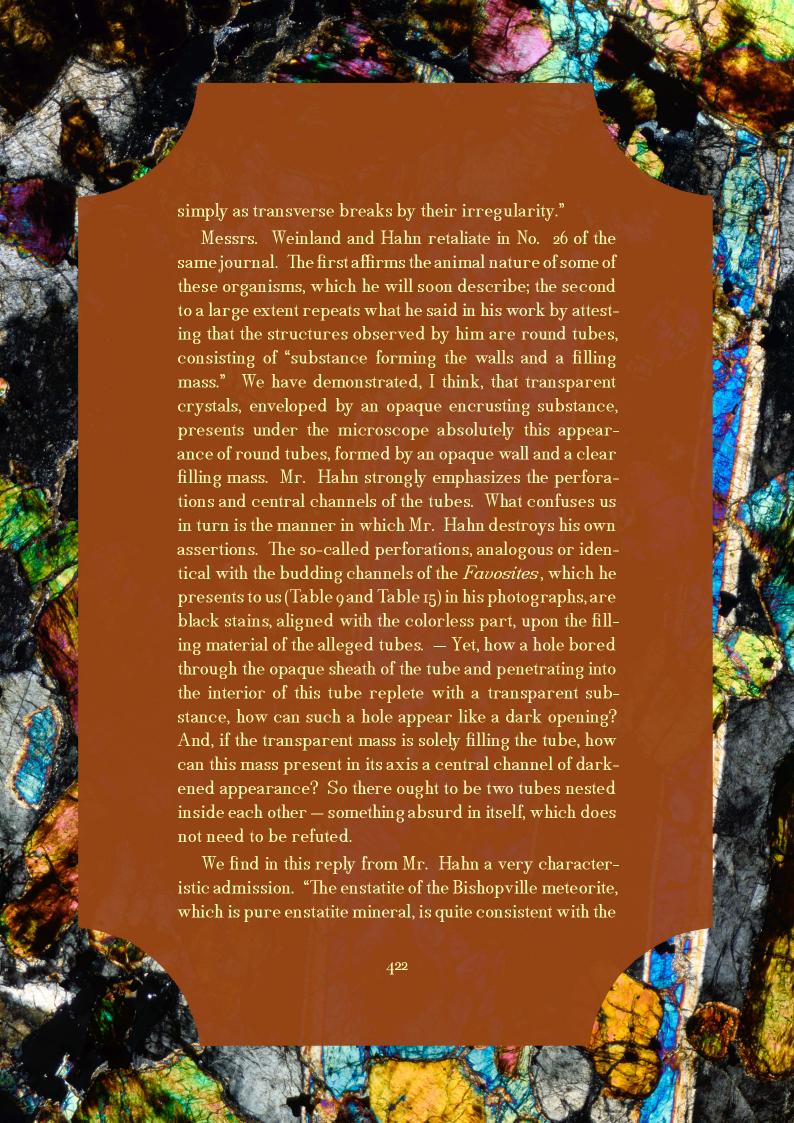


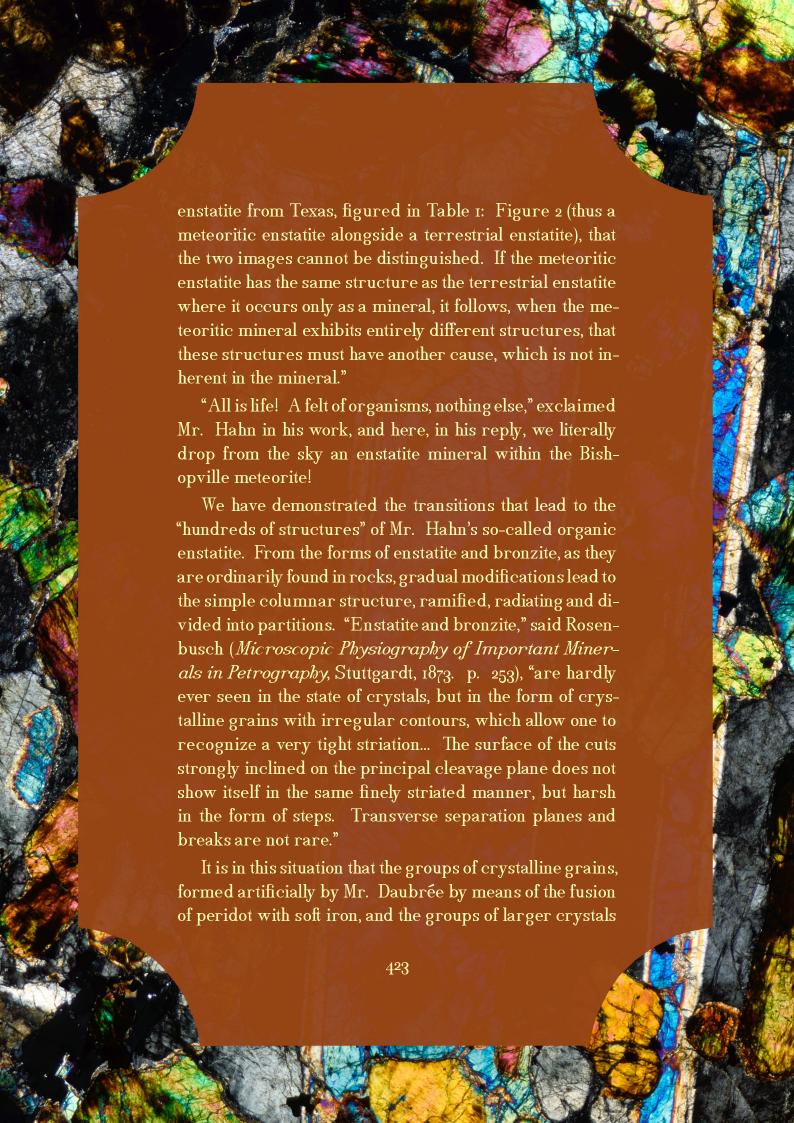


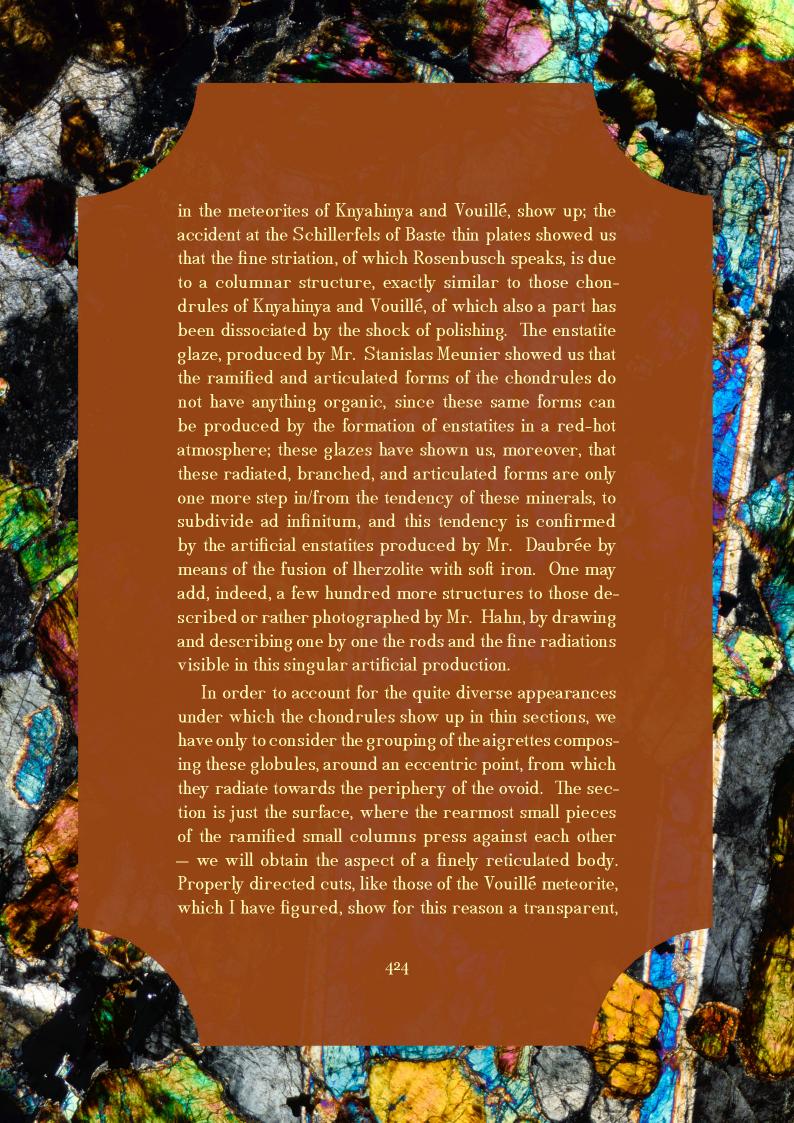


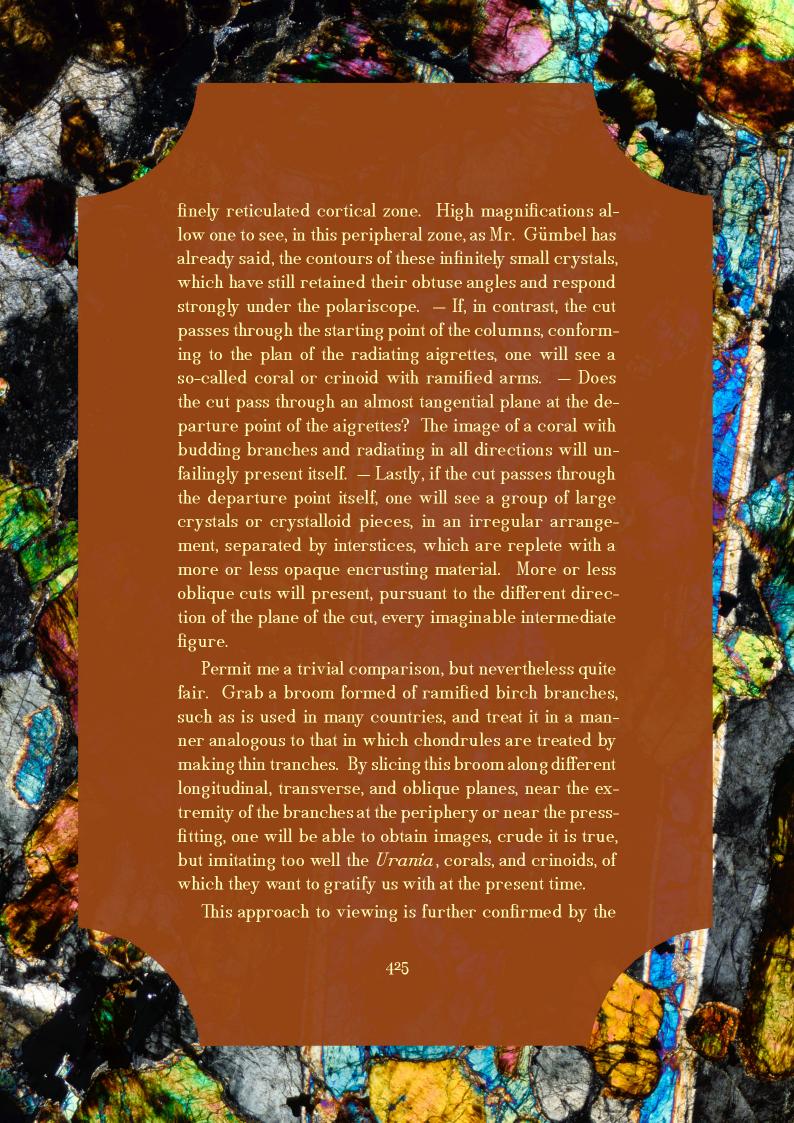


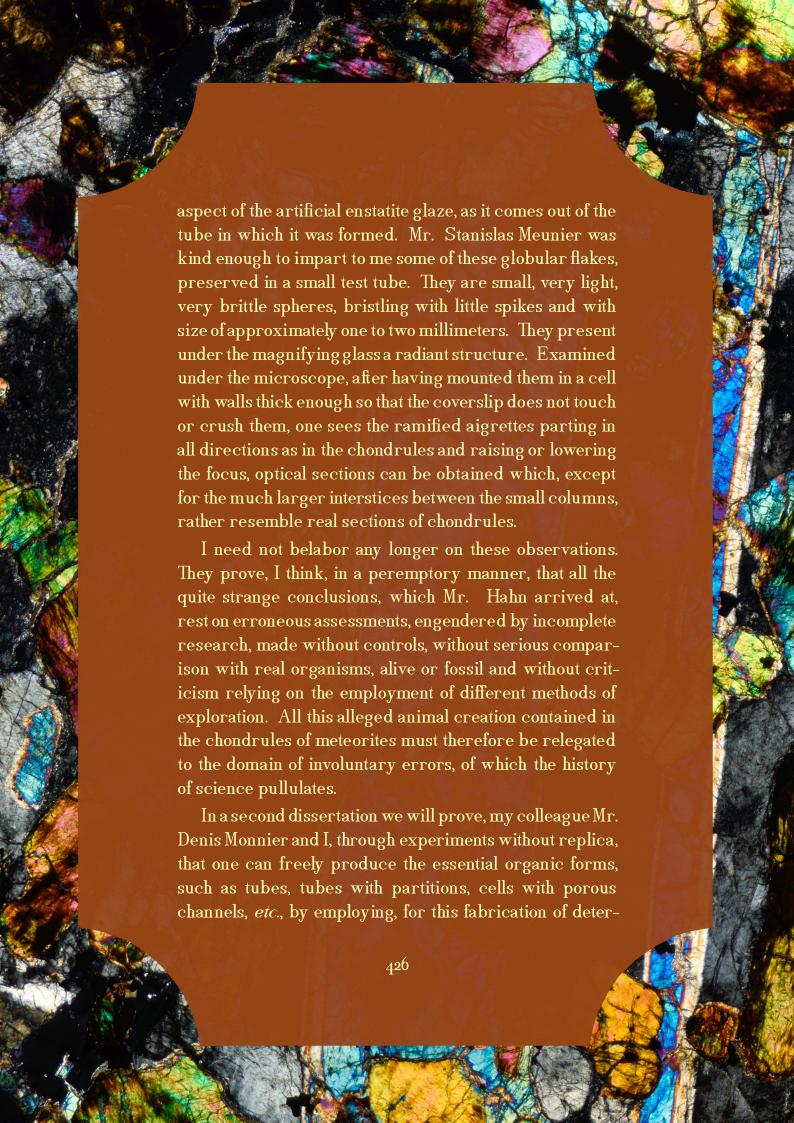


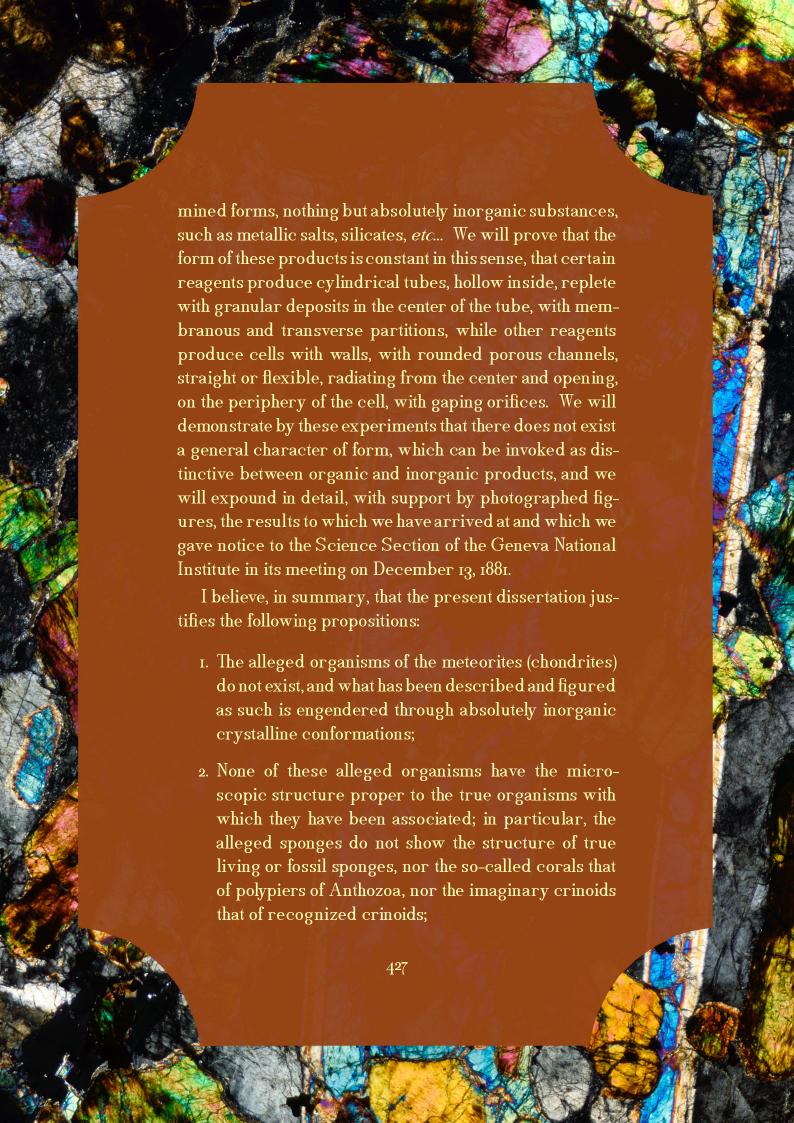


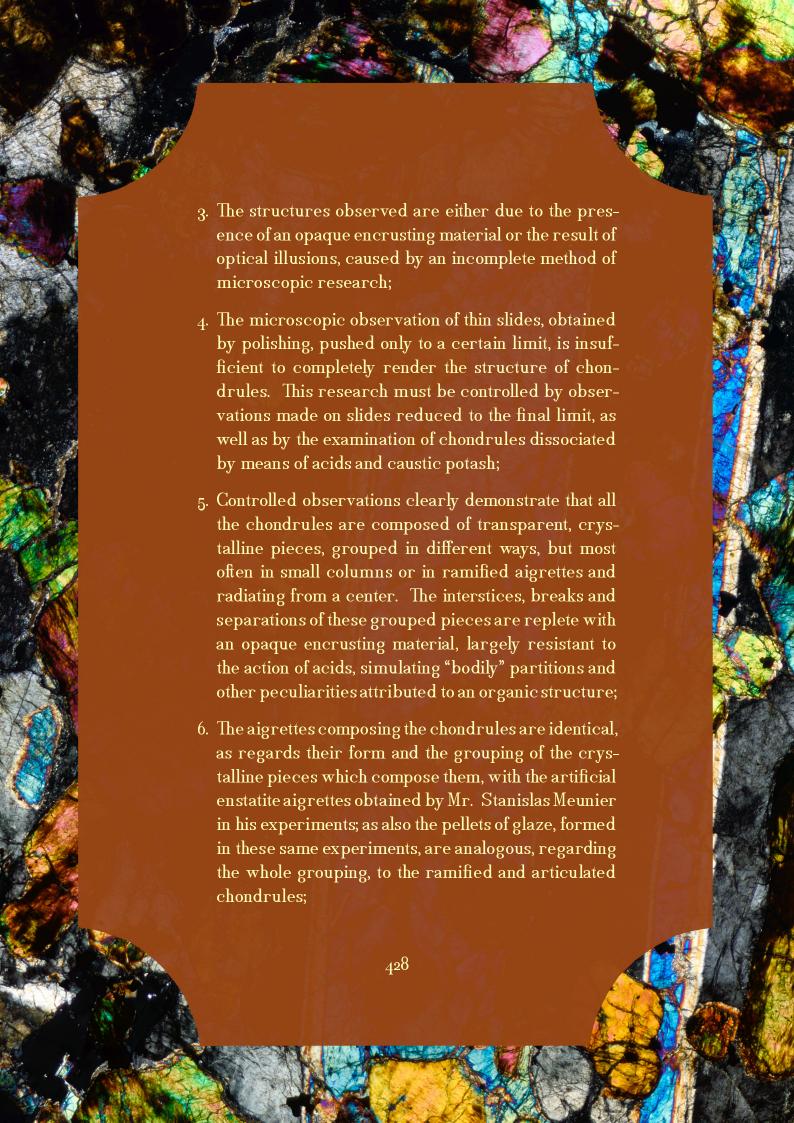


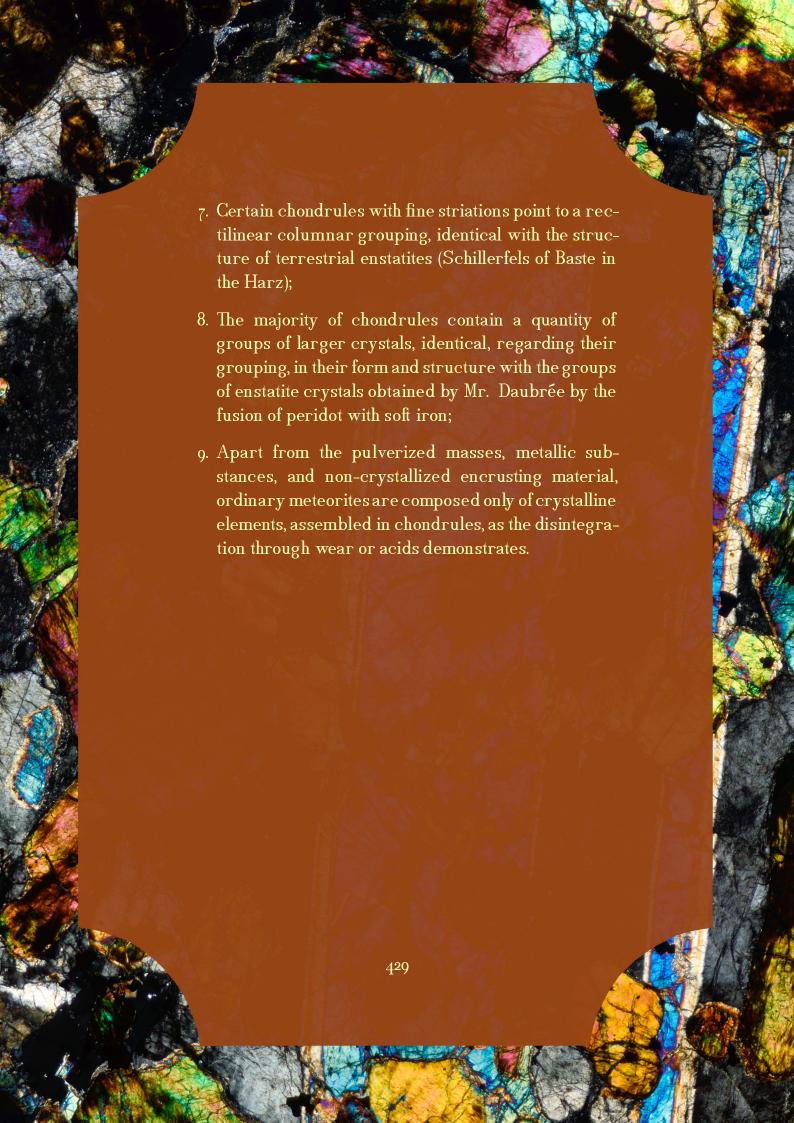


















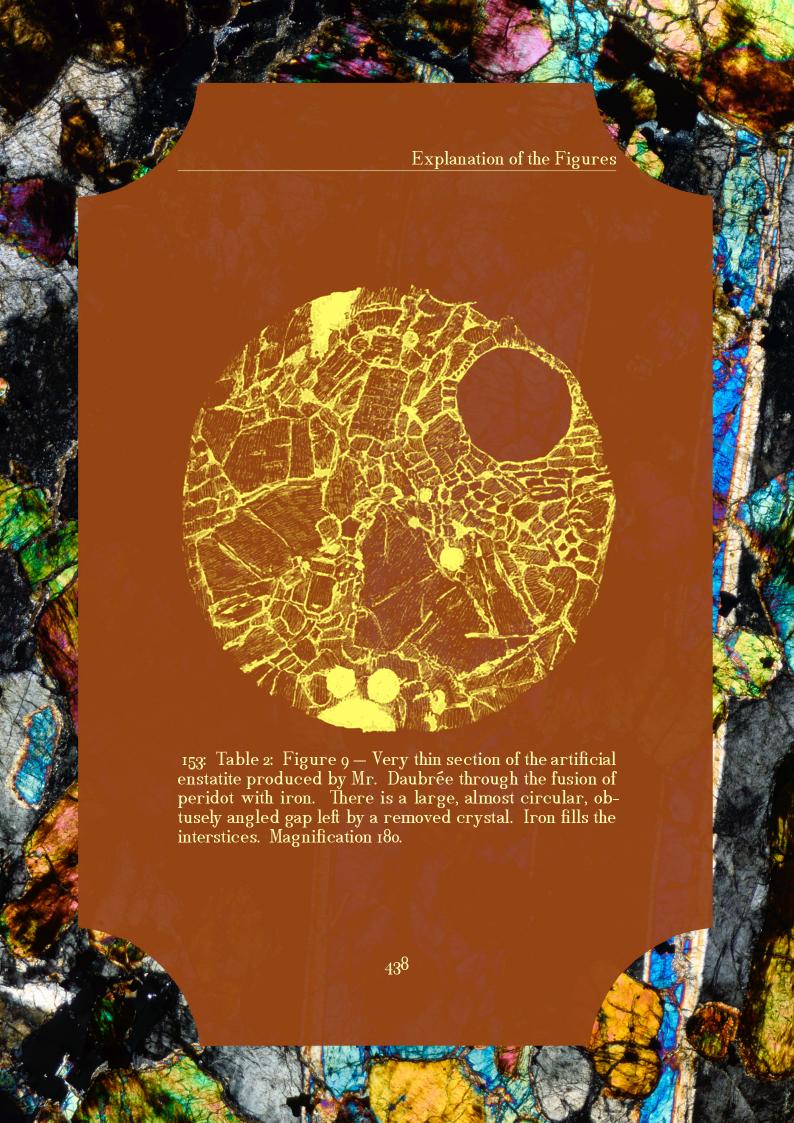


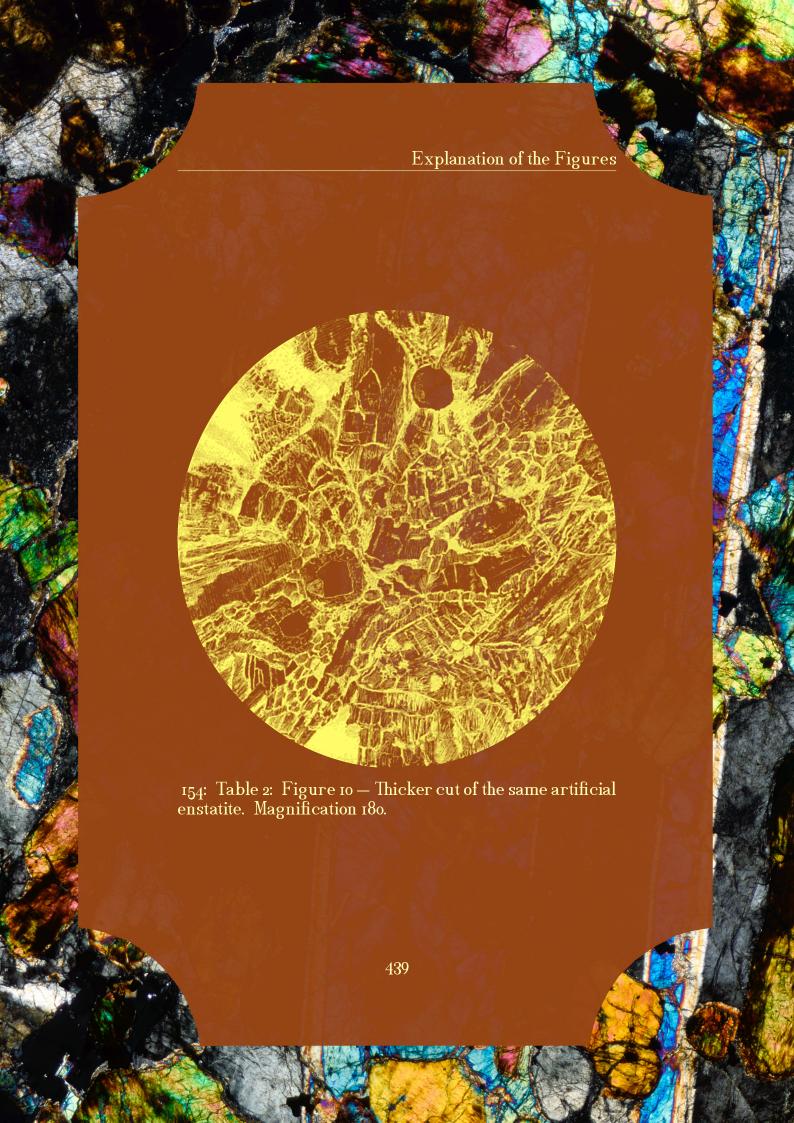


























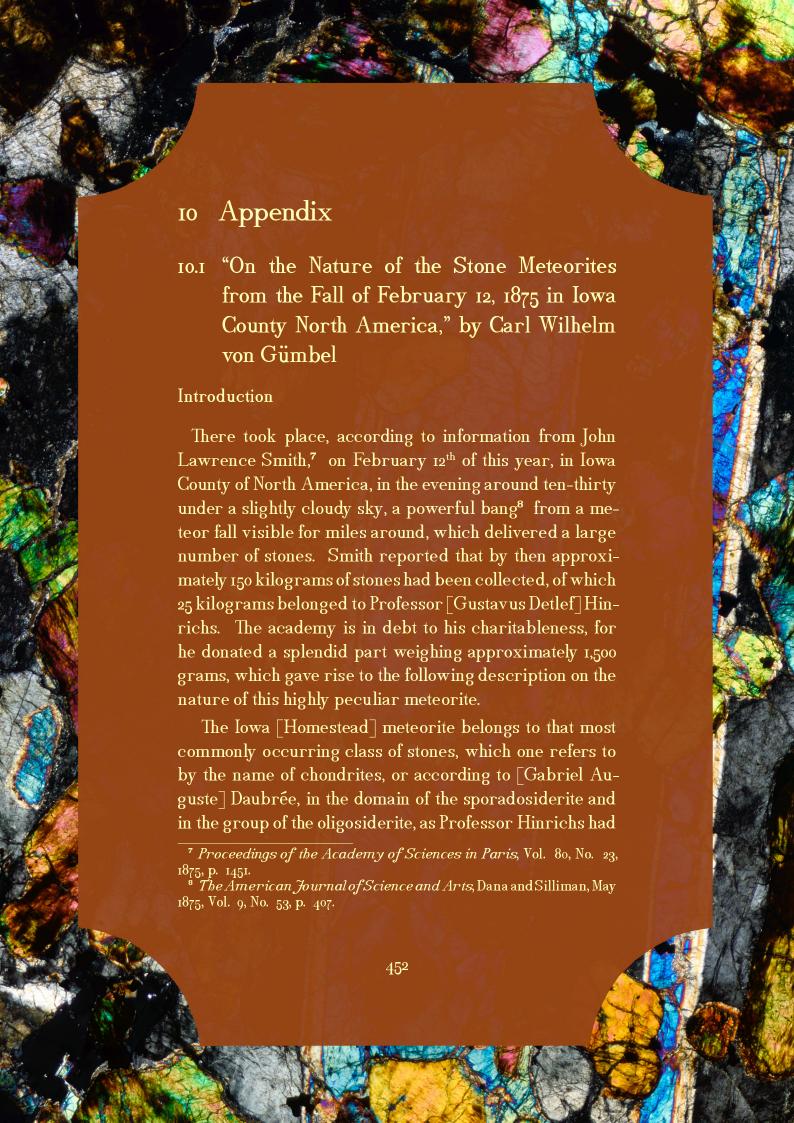




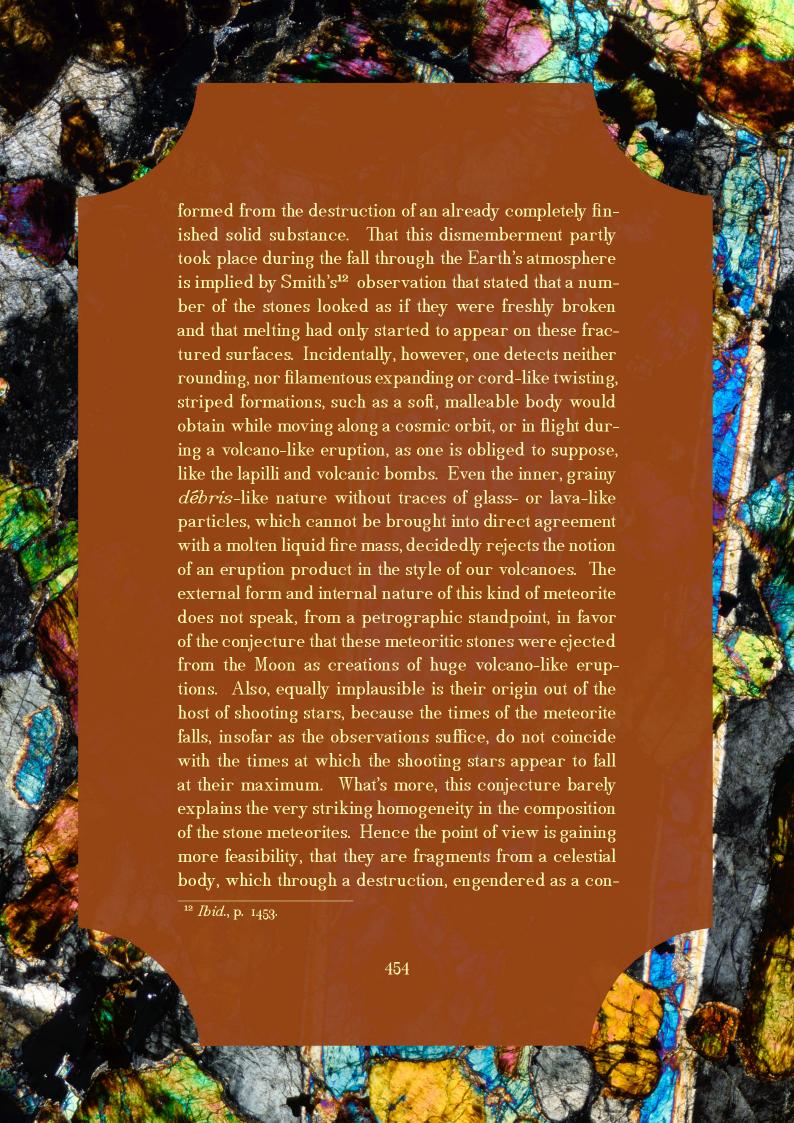




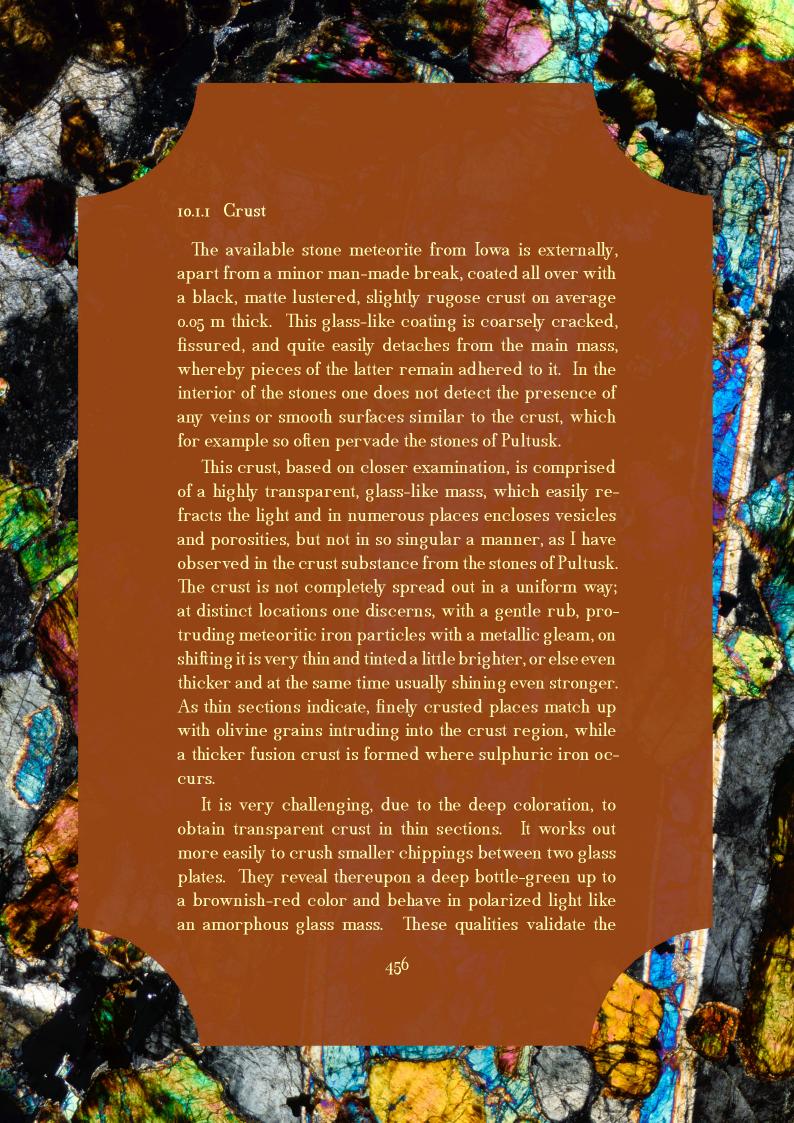


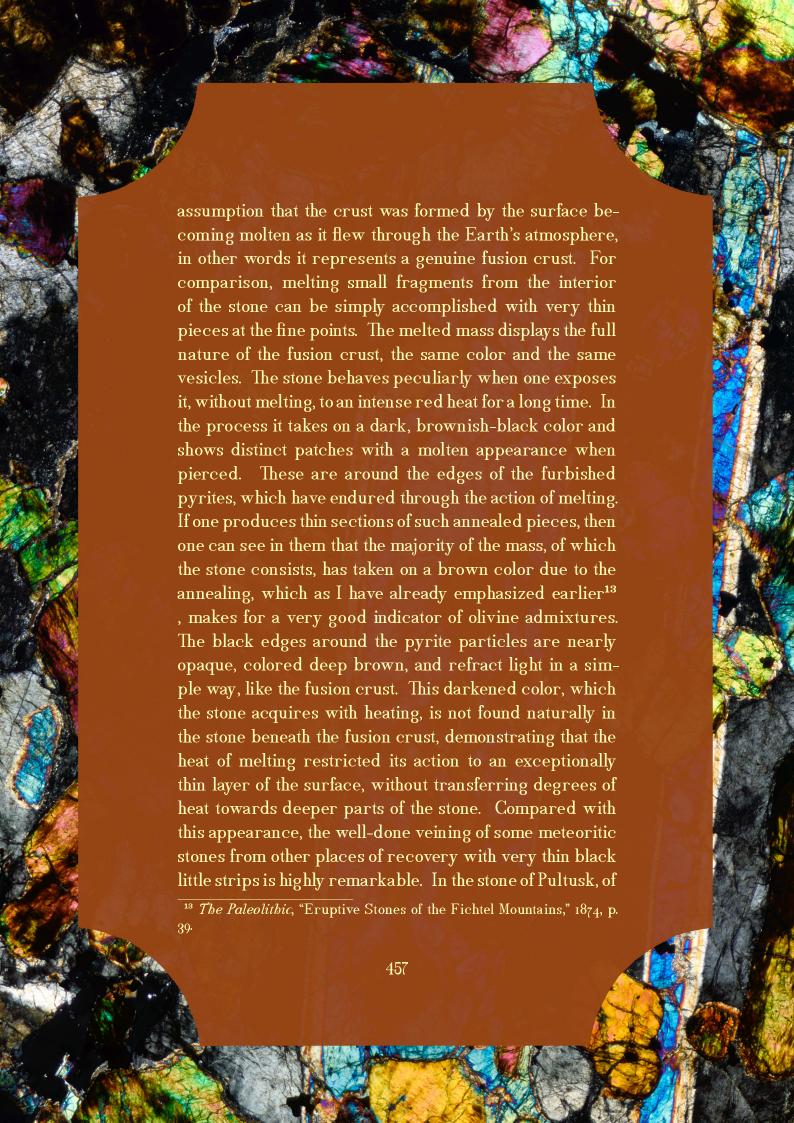


correctly noted in his accompanying letter to the Paris Academy, which included a portion of all these meteorites, and corroborated by Daubrée himself. The considerably sharp-edged, acute-angled, unevenly tetrahedral stone is coated all over with a black fusion crust, and inside light grayish white, furnished with abundant small black nodules and granules of meteoritic and sulphuric iron and seemingly scattered small rust stains. The stone is rather hard and cannot be crushed with the hand. Its overall character is not much different from the stone meteorite of Pultusk, in that, apart from the meteoritic and sulphuric iron, its main mass is whitish and yellowish, in which the individual shiny glass olivine granules contrast with the partly dark, partly light, sometimes opaque globules (chondrule spheres). Daubrée<sup>10</sup> compares it with the stone meteorites of Vouillé (May 13, 1831) and of Aumale in Algiers (August 25, 1865). Through this fall the tally of this type of most prevalent meteoritic stone, the chondrite, already above all others, is again increased by one and the impression of a unitary source of all these fragments from a once connected whole, which [Stanislas Etienne Meunier also recently so strongly stressed, is significantly reinforced. The exterior, fairly sharp-edged and angular form of the stones in these falls, which is only slightly obscured by the thin, superficial fusion crust, undoubtedly indicates débris of a larger, fragmented stone mass, which was <sup>9</sup> Proceedings of the Academy of Sciences, 1875, p. 1175. <sup>11</sup> Course on Comparative Geology. Compare with: [Gustav] Tschermak, The Formation of the Meteorites, Proceedings of the Academy of Sciences in Vienna, Vol. 71, Sec. 2, 1875. 453





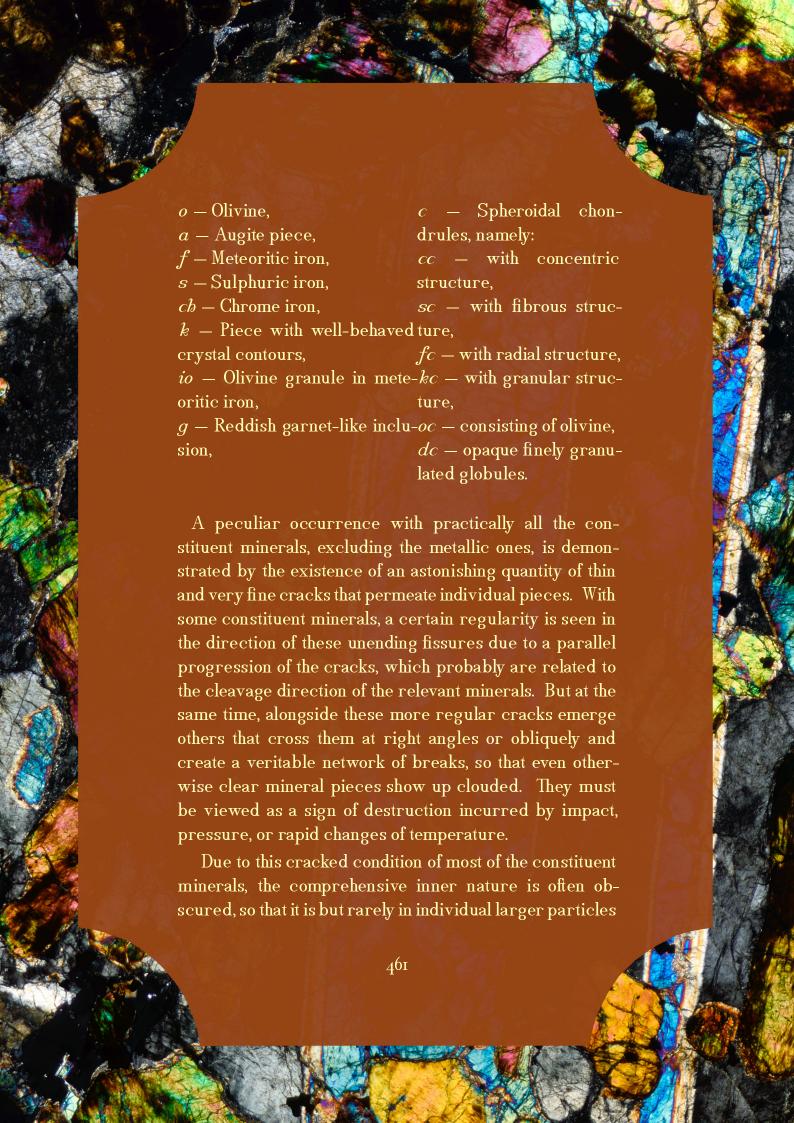


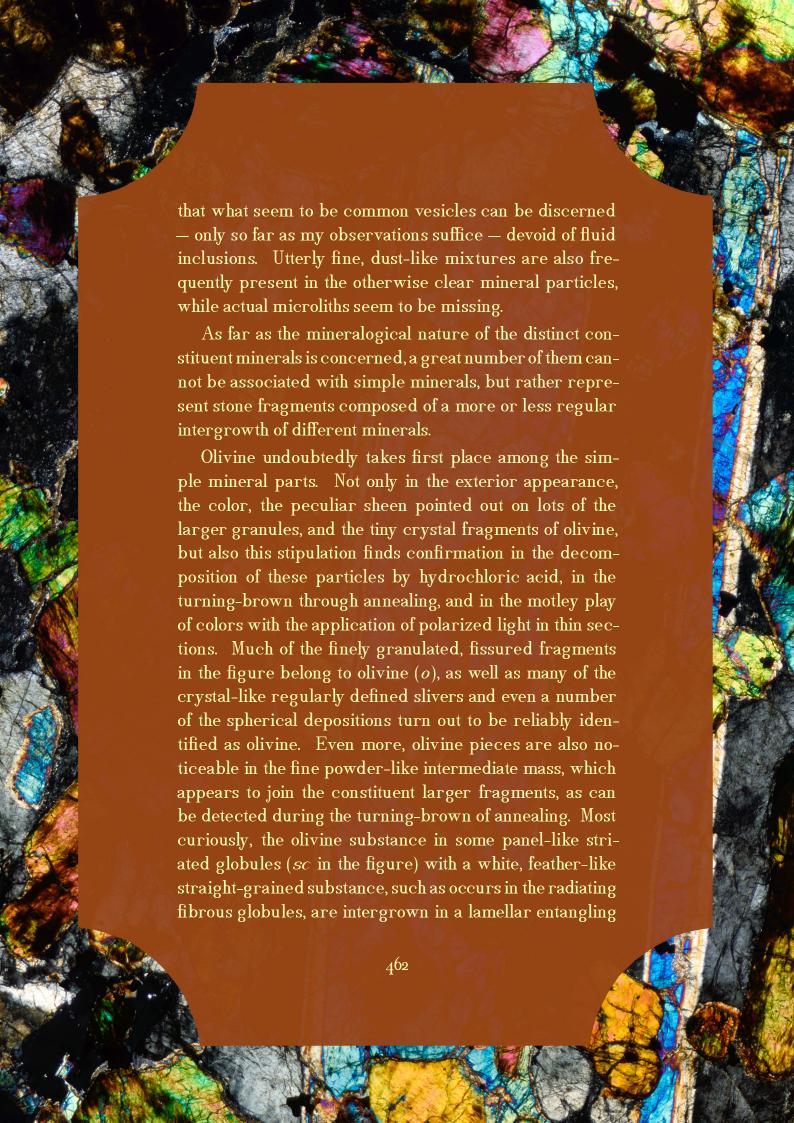


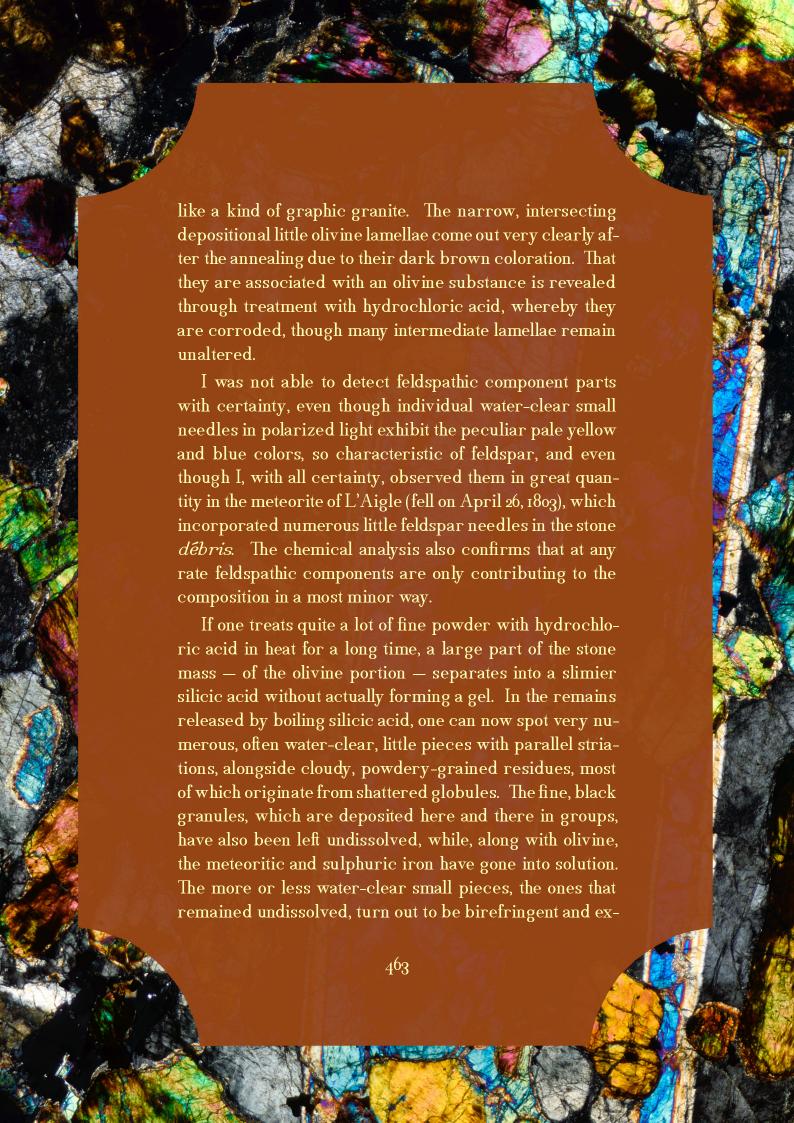




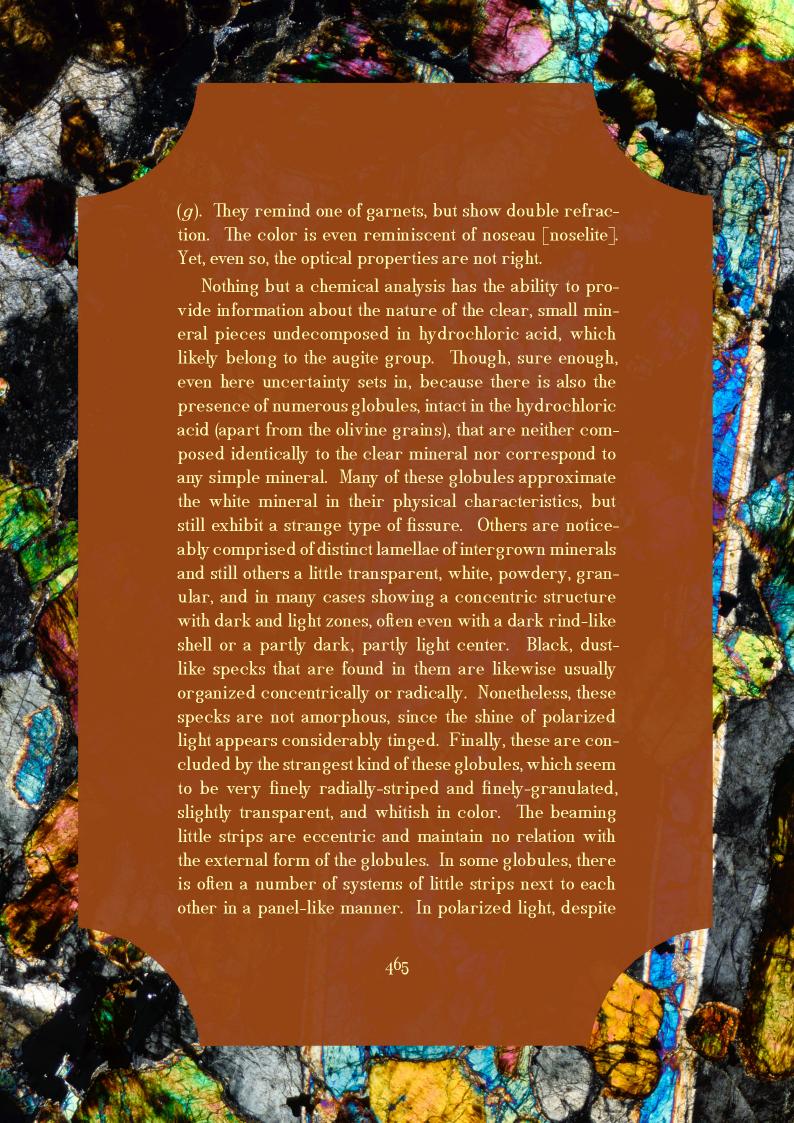












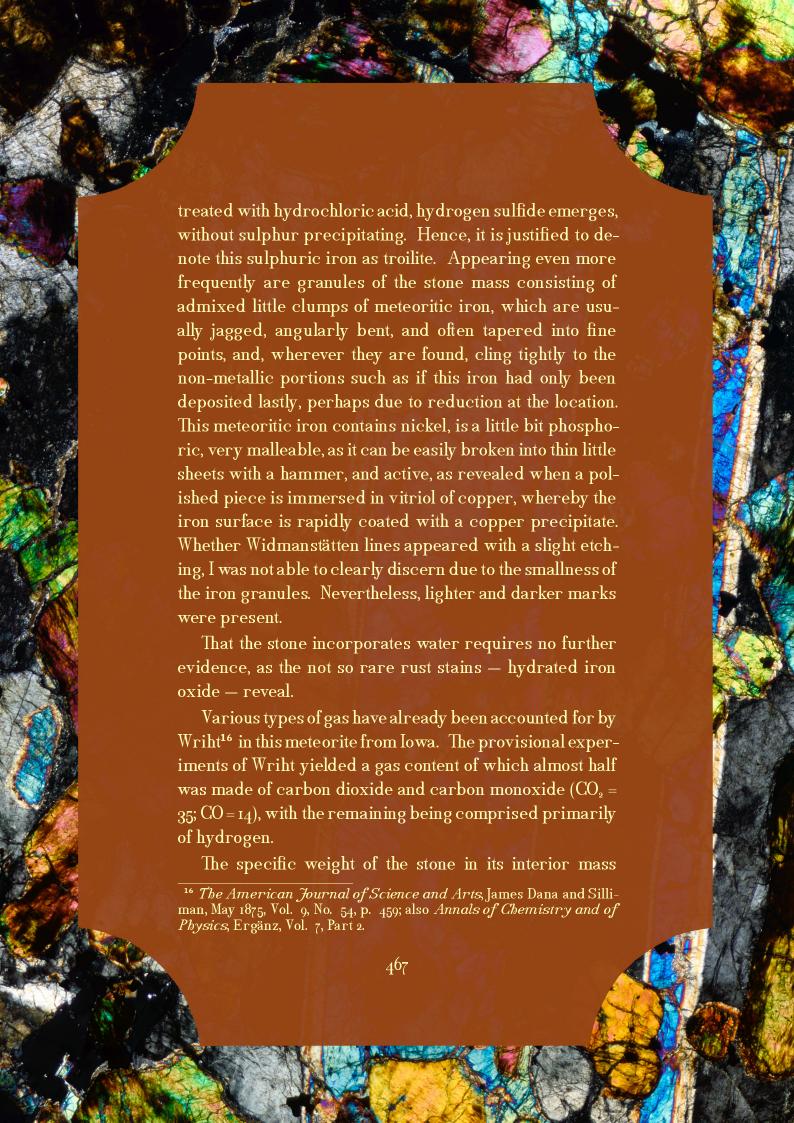
the low transparency, noticeably tuft-shaped stains show up, which are reminiscent of the well-known phenomenon of many variolite nodules, though without them being quite the same. The lamellar intergrowth of small olivine-like strips with a likewise fibrous white substance has already been mentioned.

Concerning the the formation of these curious constituent components of the meteoritic stones, Daubrée<sup>14</sup> assumed that they had formed by a solidification during a vortical flight through gases, Tschermak<sup>15</sup> was in favor of a development as a result of a tumbling of already solid débris through a prolonged flow, such as is produced during a volcanic explosion, referring to similar such round globules in the trachytic tuffs of [Bad] Gleichenberg, etc. The latter hypothesis explains the peculiarities perceived in many of the globules, that their inner chamfered structure is devoid of any relation to the external spherical shape. Even for the globules with a clearly concentric structure, this mode of formation may be held, if one assumes that, as is quite likely, the concentric strips and shelled dissociations are merely secondary phenomena, as a result of mechanical and chemical variations, that are to be understood as incurred only after the tumbling of the rounded grain.

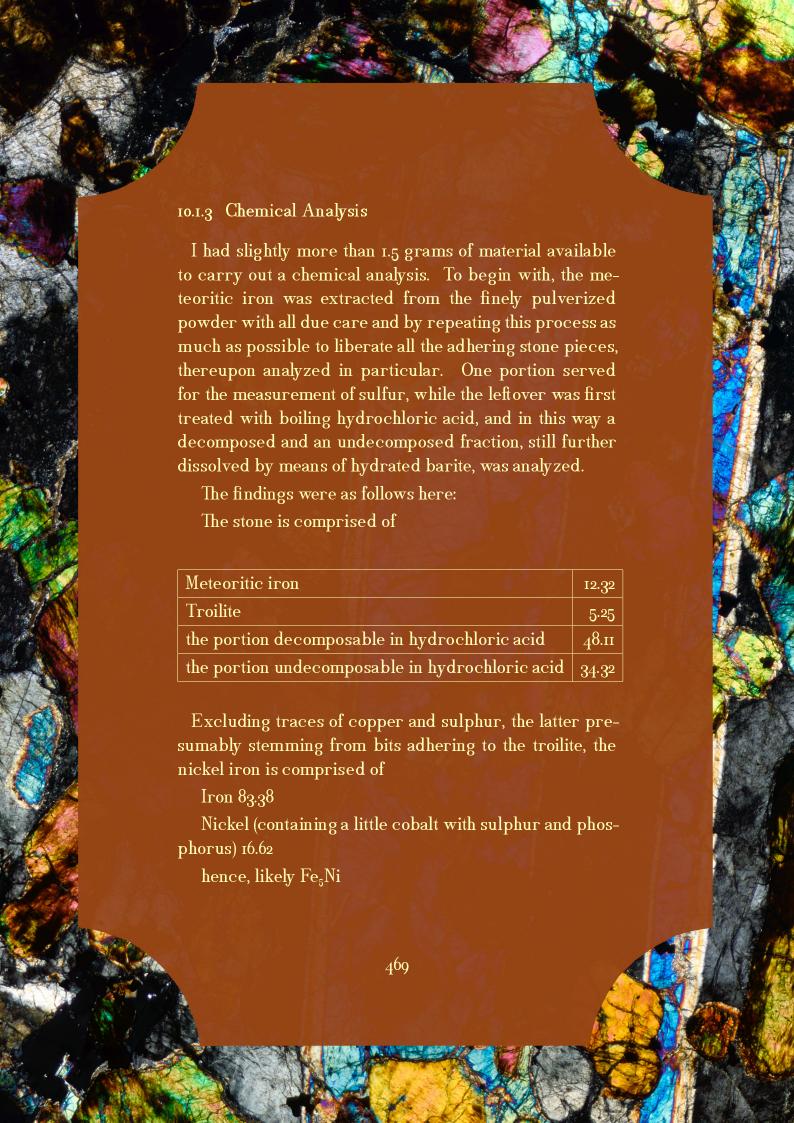
Sulphuric iron makes up a significant portion of the composition of the stone from Iowa. It shows up spread into tiny irregularly defined spots, sandwiched, so to speak, between the constituent pieces. When the stone powder is

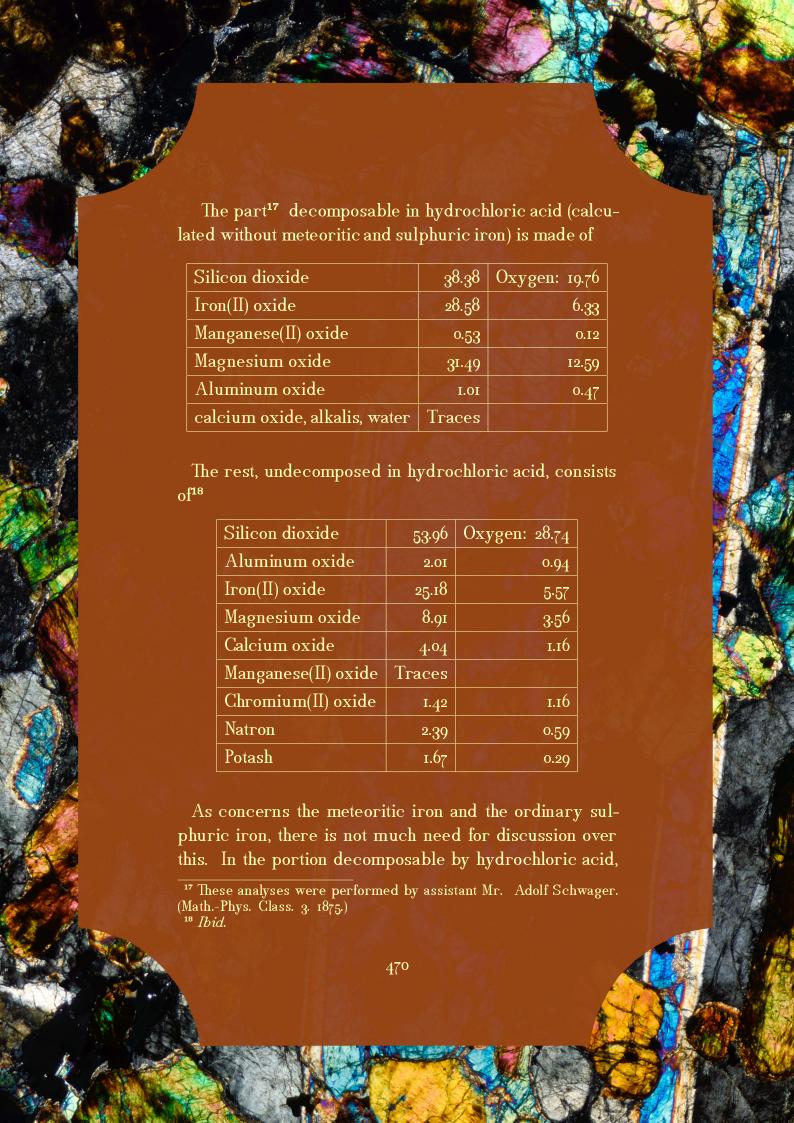
Journal des Savants, 1870, p. 38.

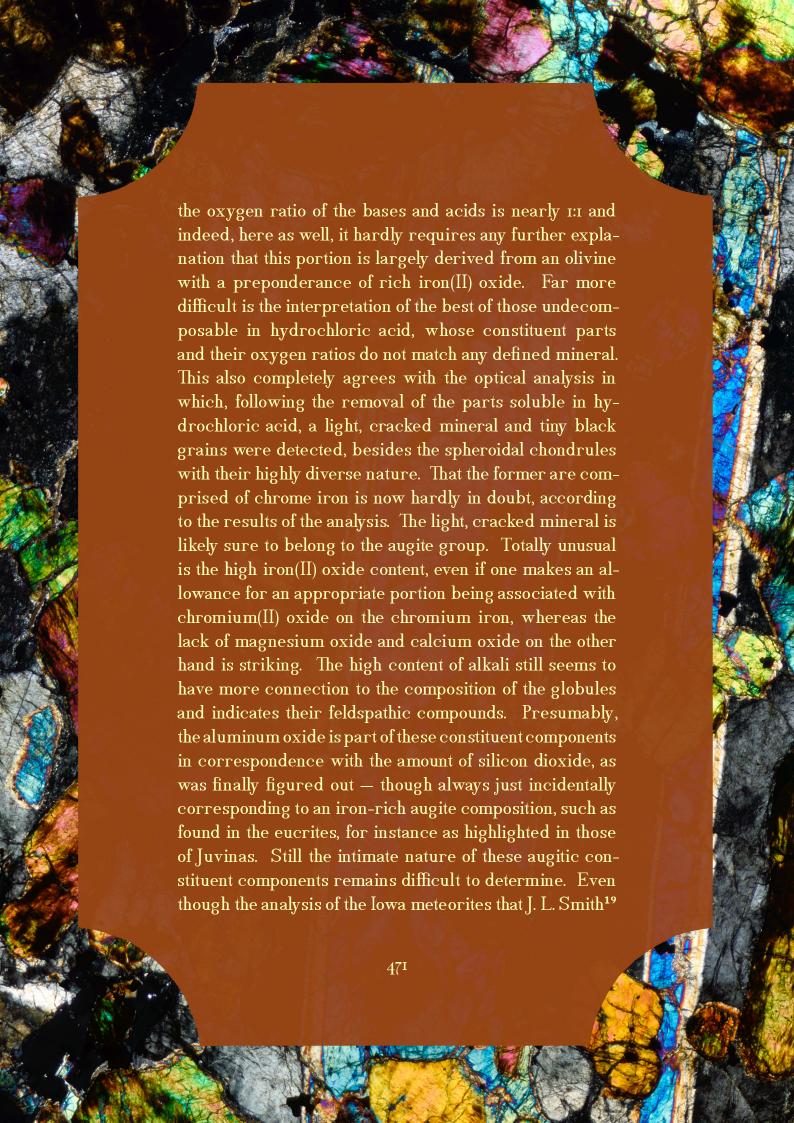
Sec. 2, 1875, April Issue, pp. 9-10.

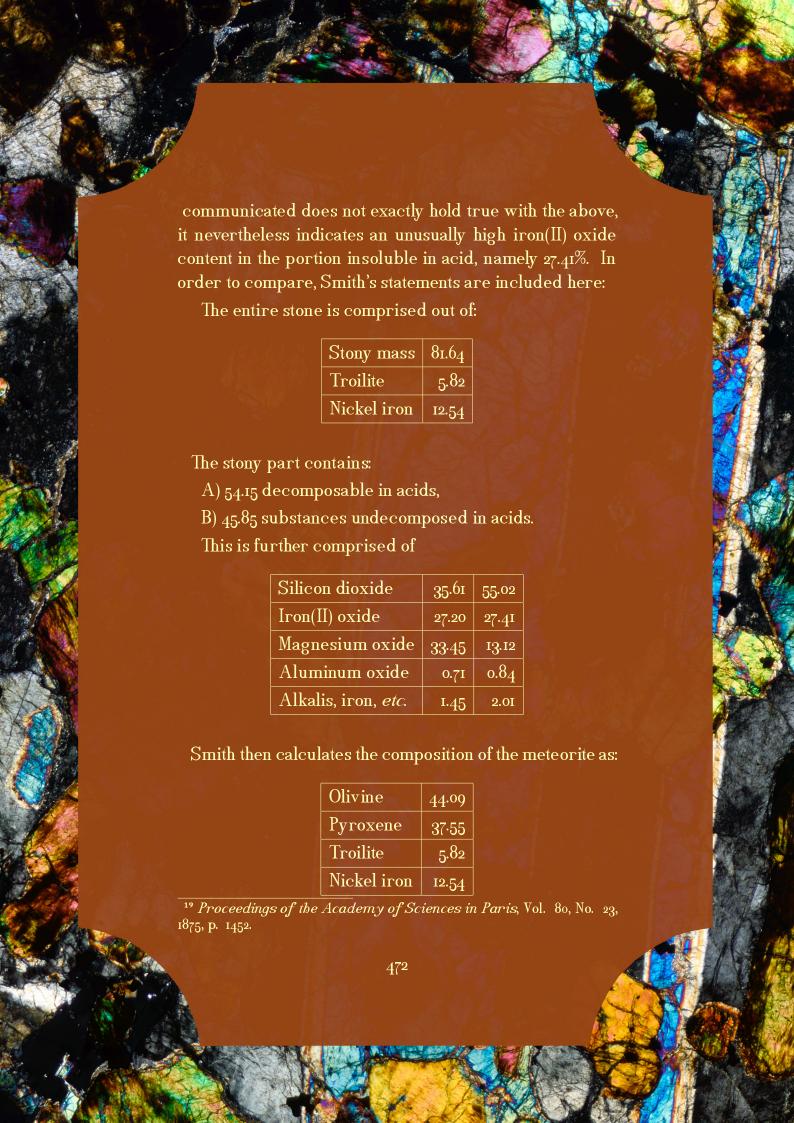




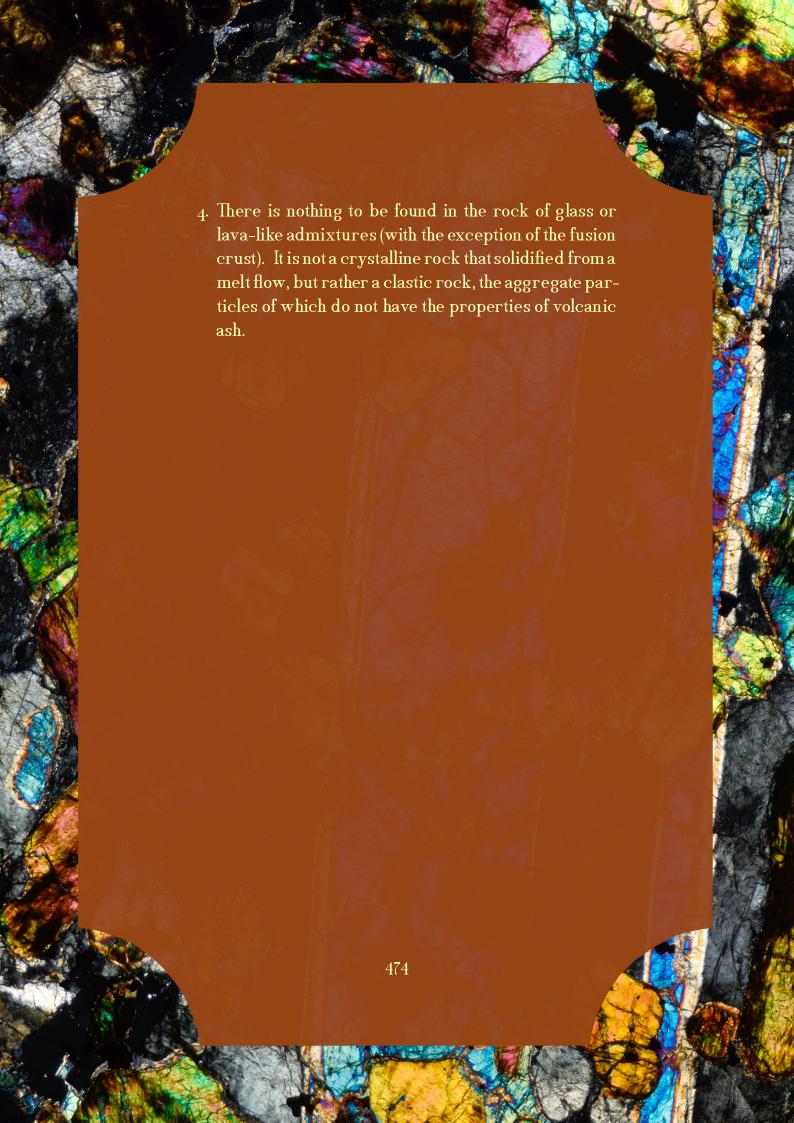




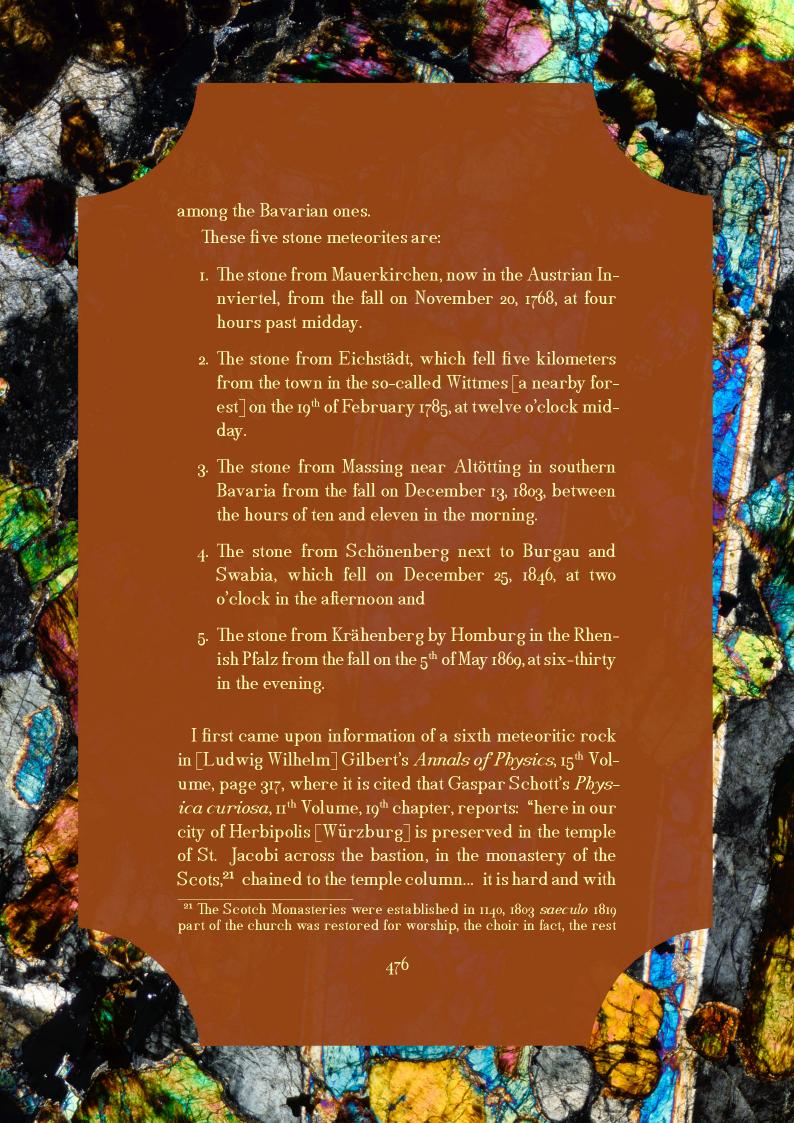




The round globules did not get further consideration in the account, which certainly does not seem natural, because these globules cannot be considered as consisting of augite. Among the chondrites analyzed up till now, it is only that of Tadjera with a similar composition,<sup>20</sup> though poorer in silicon dioxide and richer in calcium oxide. Bringing together the findings of this survey of the stone meteorite of Iowa, they justify the following conclusions: I. The stone mass is comprised of irregular little mineral fragments of olivine and a substance related to augite, and appears to have been taken from a shattered rock. These same distinct small pieces are assembled from different admixed minerals. Also, a feldspathic substance seems to be present in low quantities. Finely pulverized pieces of these minerals seem to surrender the filling agent. 2. Aside from the alluded to small mineral pieces, a significant part of the substance of the stone is made of the roundish globules. They partly belong to olivine and partly represent lamellar intergrowth of minerals or exist as a radial, fibrous mass. A portion of these appear to be of a feldspathic substance. They owe their form to a mechanical rounding. 3. The meteoritic iron granules are nestled between the little mineral slivers and globules, as if they were formed retroactively due to reduction. <sup>20</sup> [Carl] Rammelsberg, *The Chemical Nature of the Meteorites*, p. 157. 473



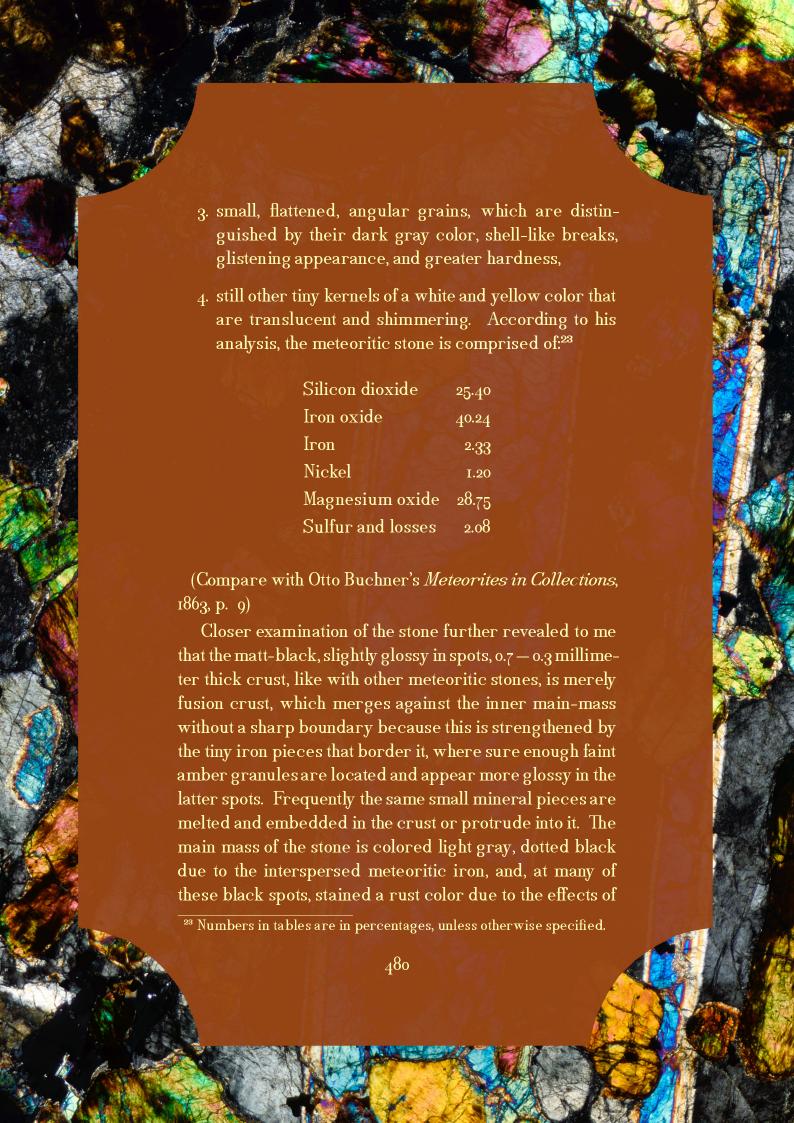


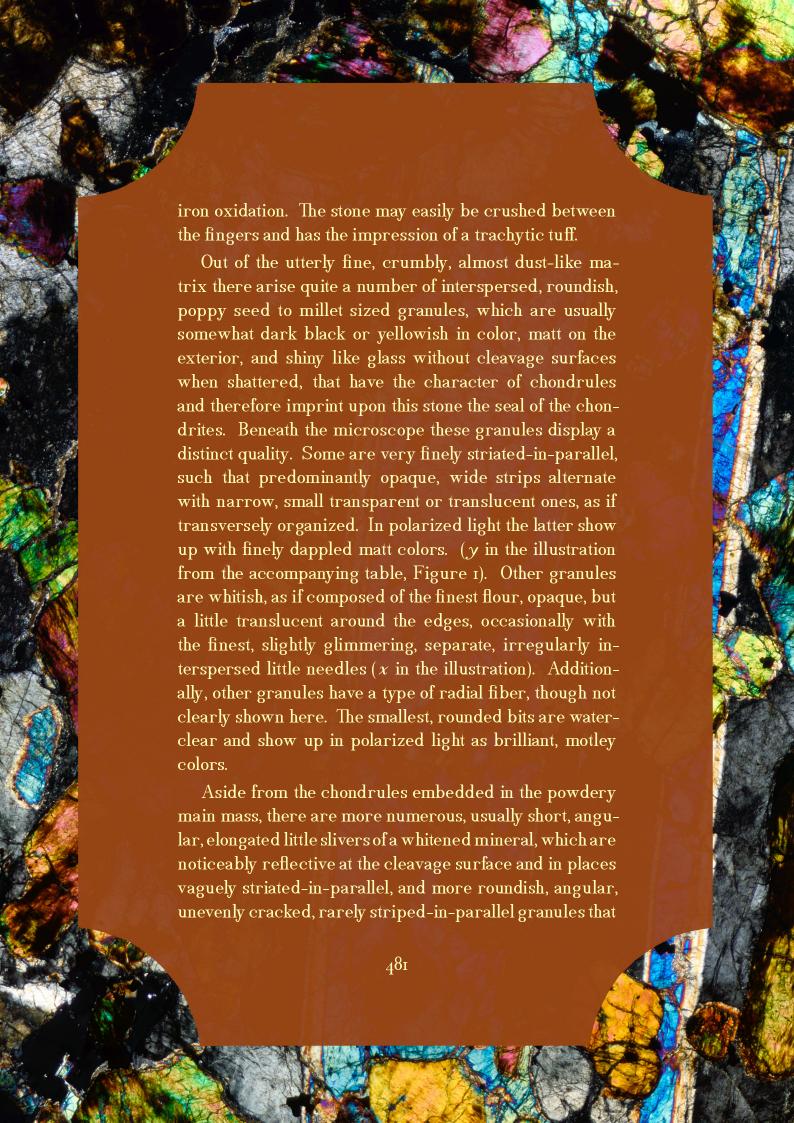




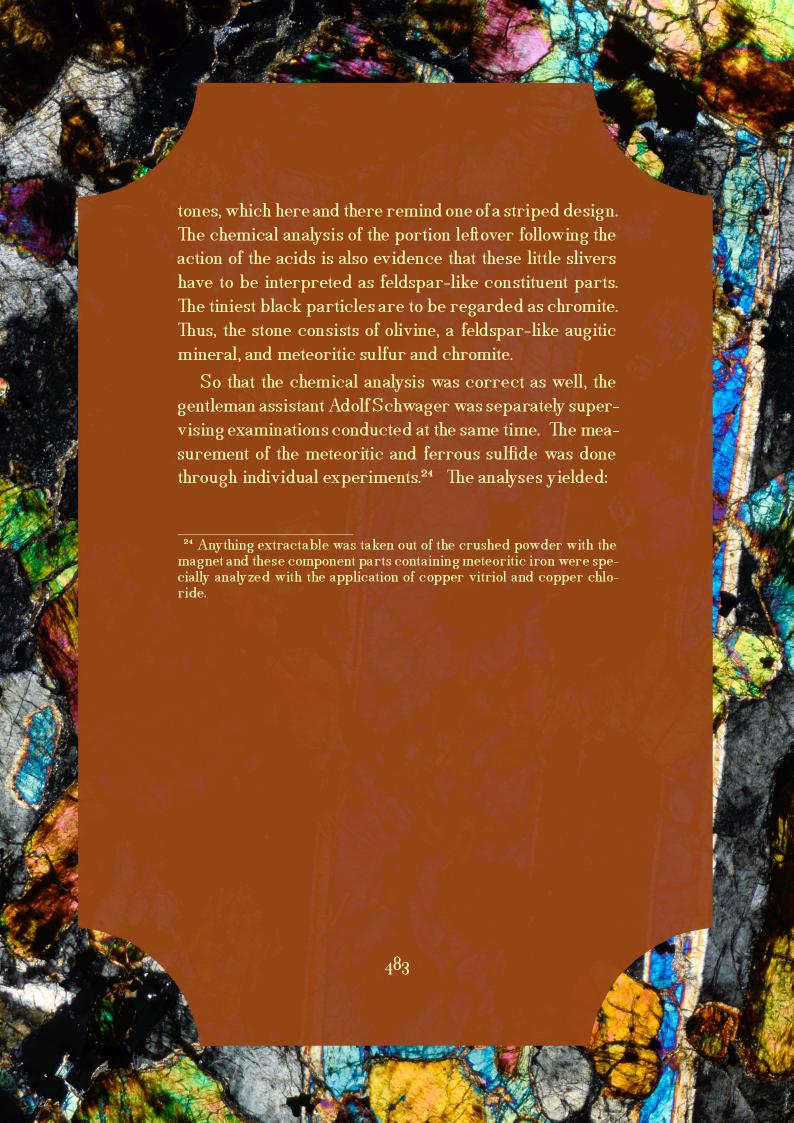


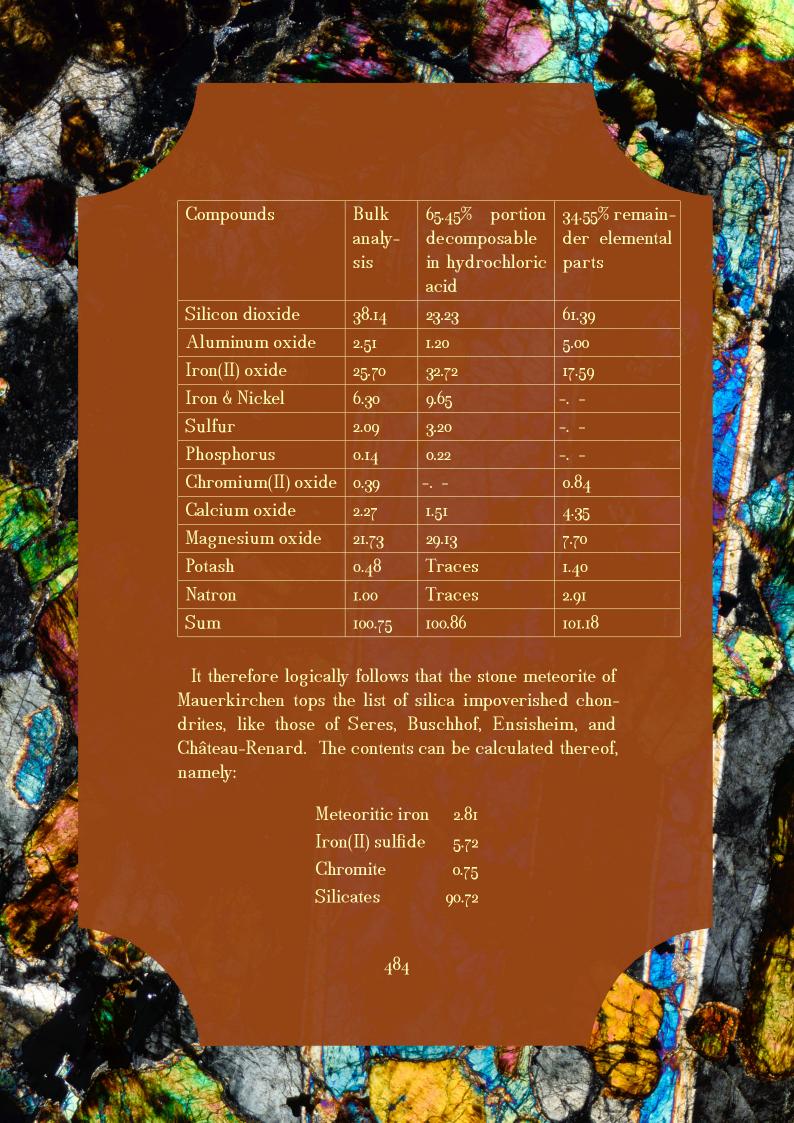
folk near Mauerkirchen, who swore to it when questioned, stated that in the evening on the aforementioned day after four o'clock the skies noticeably darkened against the west, and they heard an extraordinary roar and powerful bang in the air like thunder and with shooting fragments. Beneath this aerial turmoil a rock had fallen out of the air and, according to an authoritative visual inspection, made a pit in the ground two and a half schuh<sup>22</sup> deep. The stone did not even hold up to be a schuh in length, was six zoll wide, and weighed 38 bavarian pounds. It was made of matter so soft that one could crush it with the fingers, the color bluish mixed with some white flows or streamers, and also coated by a black crust. Professor [Maximus von] Imhof supplemented this account (Bavarian Electoral Palatinate Weekly Paper, 1804, Section 4) with the following particulars: "The fallen rock was located the day after hearing the noise, on the so-called Schinperpoint in an oblique hole going inward two and a half schuh deep." Imhof identified the specific weight as 3.452 and described the grayish-black, one-quarter linie [line (unit)] thick crust as giving sparks on steel, furthermore as constituent components: I. reguline iron, which has fused with much of the exterior crust in little kernels and tines, is very pliable and viscous and makes a white, thick shiny filing streak, 2. pyrites, <sup>22</sup> I schuh = 29.75 centimeters, I zoll is around 2.62 centimeters, I2 linie = ı zoll 479

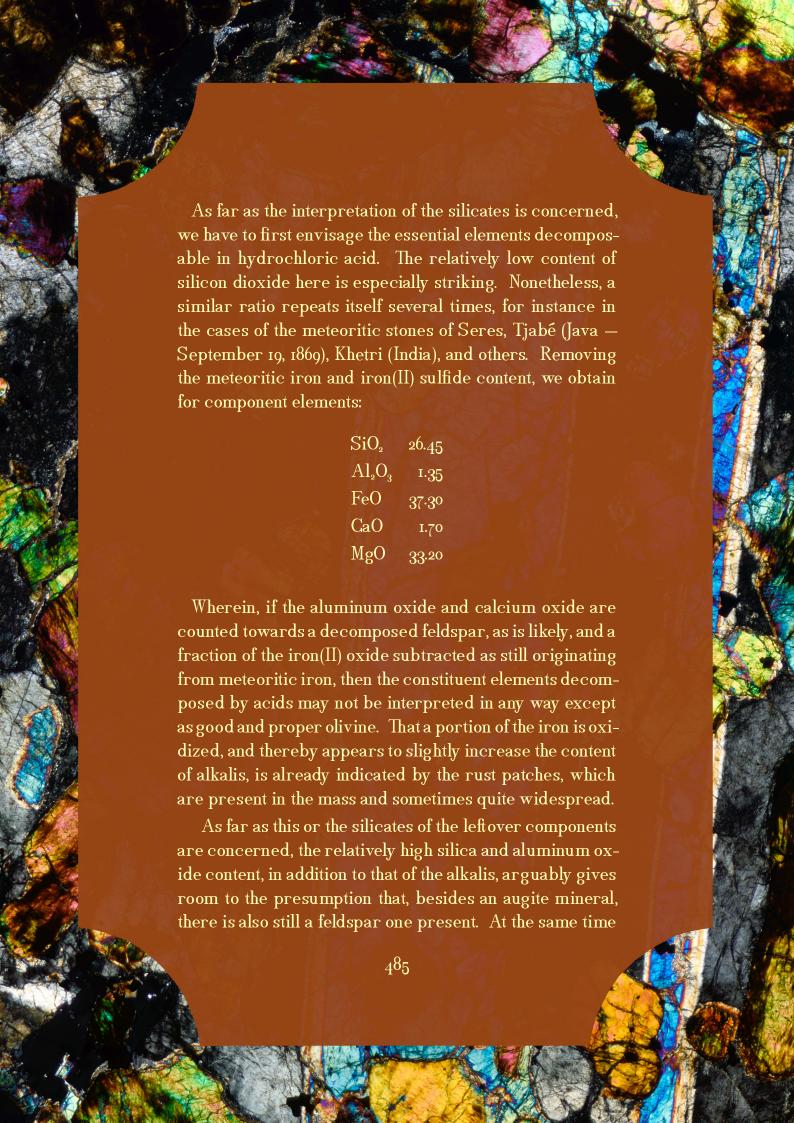


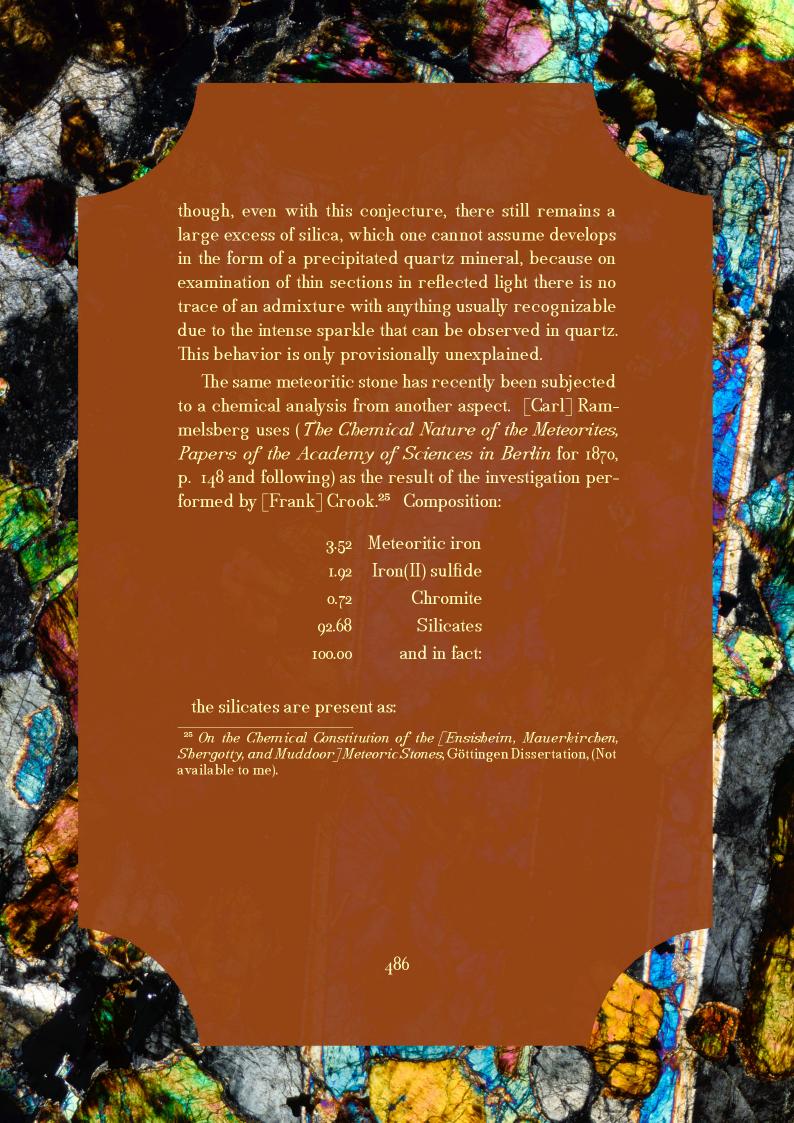




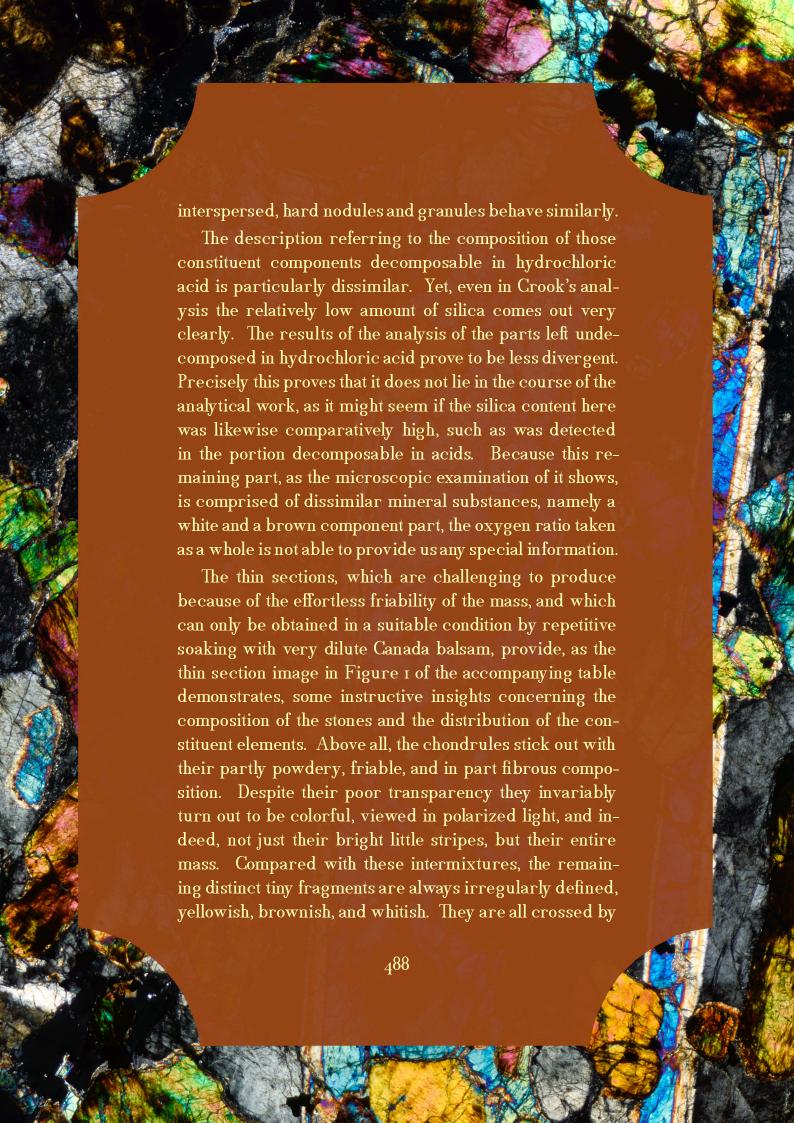








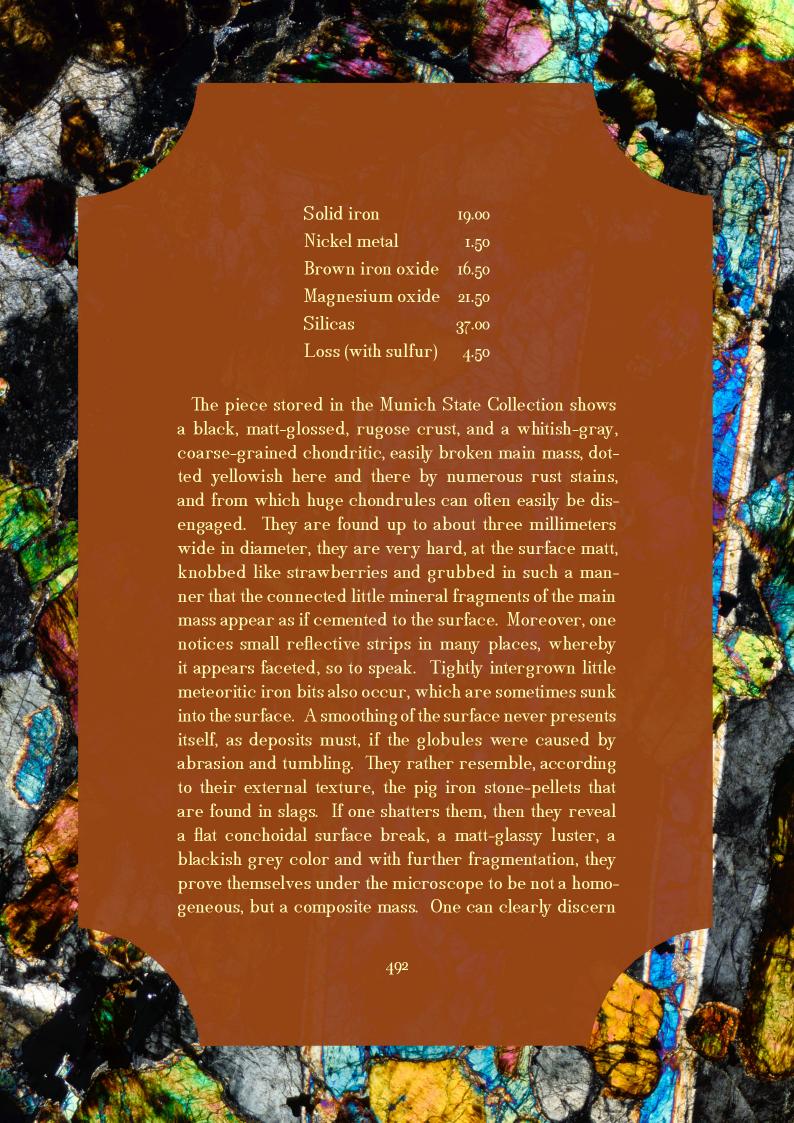
<u> </u>	Natron Potash  These results do municated earlier found except for of the meteoritic signerater level of innation, with one be quantities. The mations directly supbroadest inconsist the constituent piet this or that constituent piet this or that constituent piet a sizable way. For	Calcium oxide	Magnesium oxid	Iron(II) oxide	Aluminum oxide	Substance Silicon dioxide
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	o.67 o.40 those com- ds can be omposition or esses the this exami- er smaller thin sec- lowing the ribution of expended numbers in es of mete- ass, whose	4.91	8.20	17.71	3·94 4·17	Fraction.



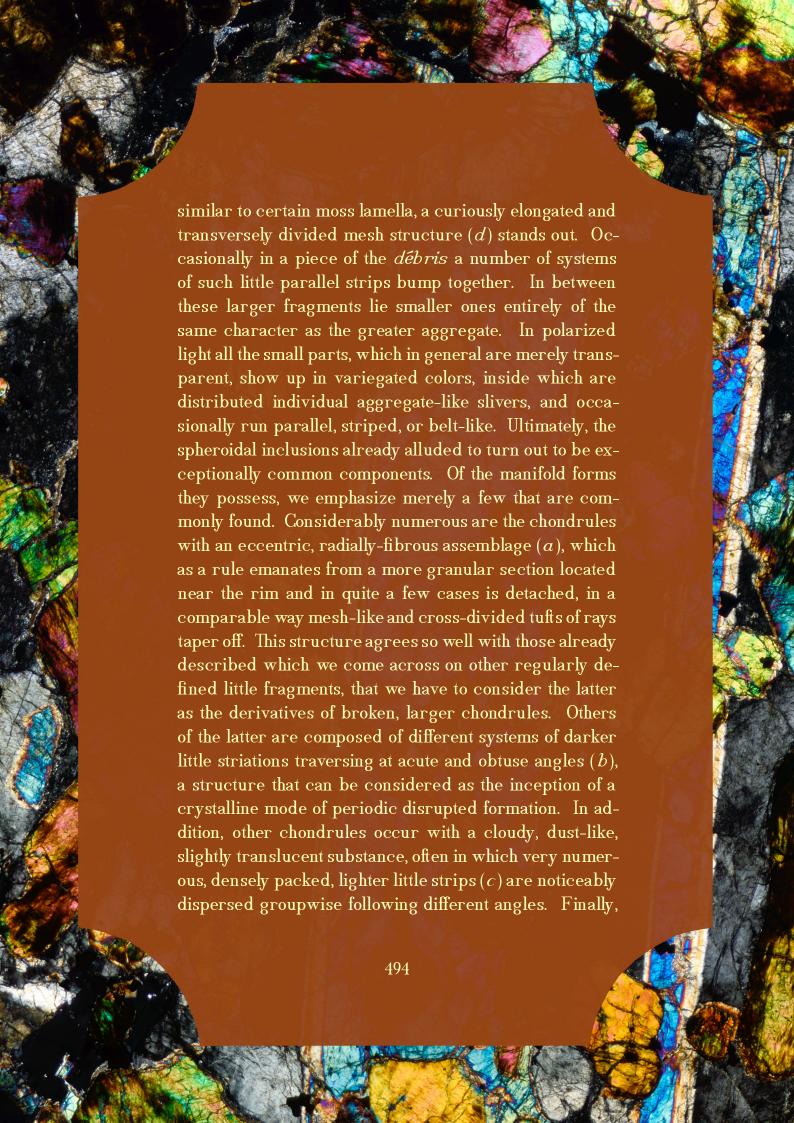


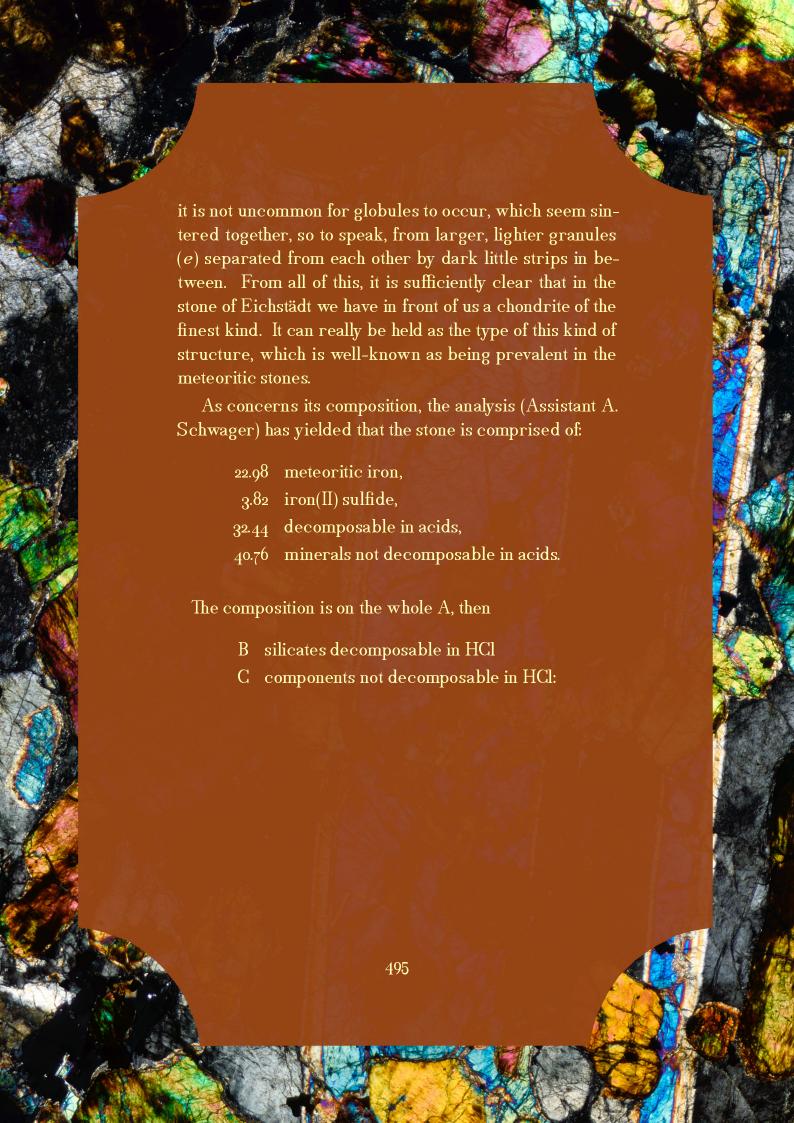


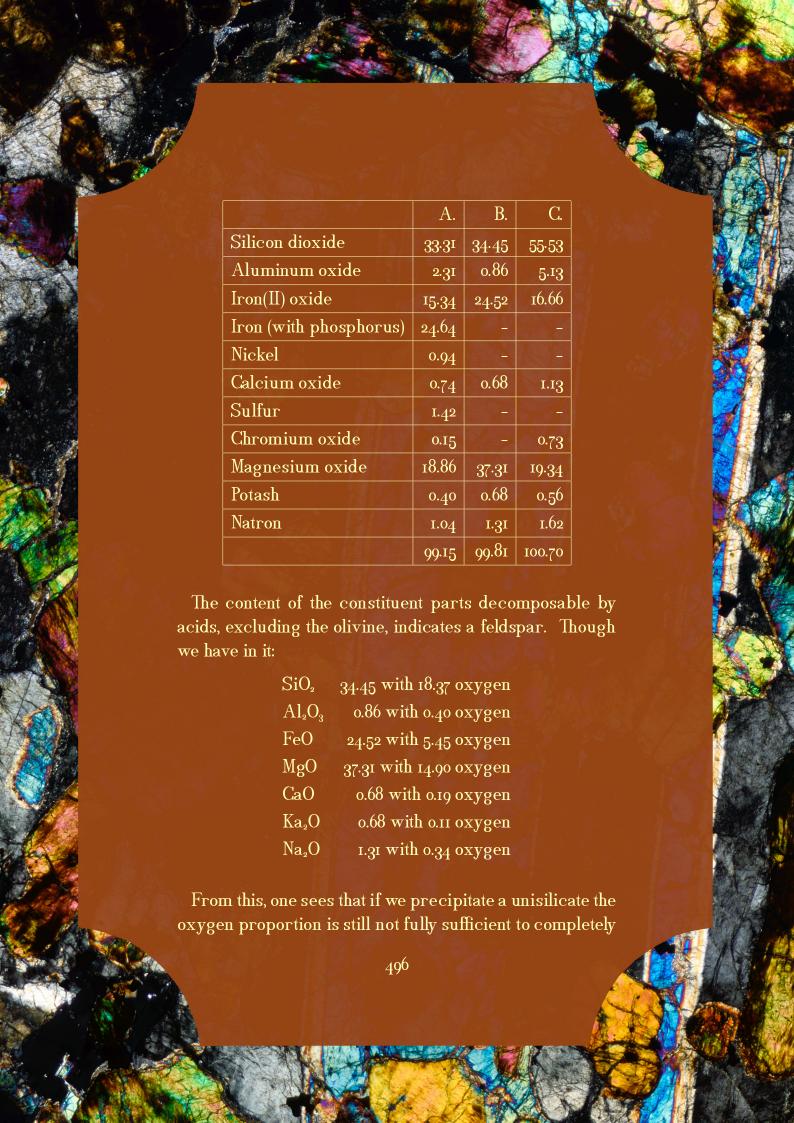


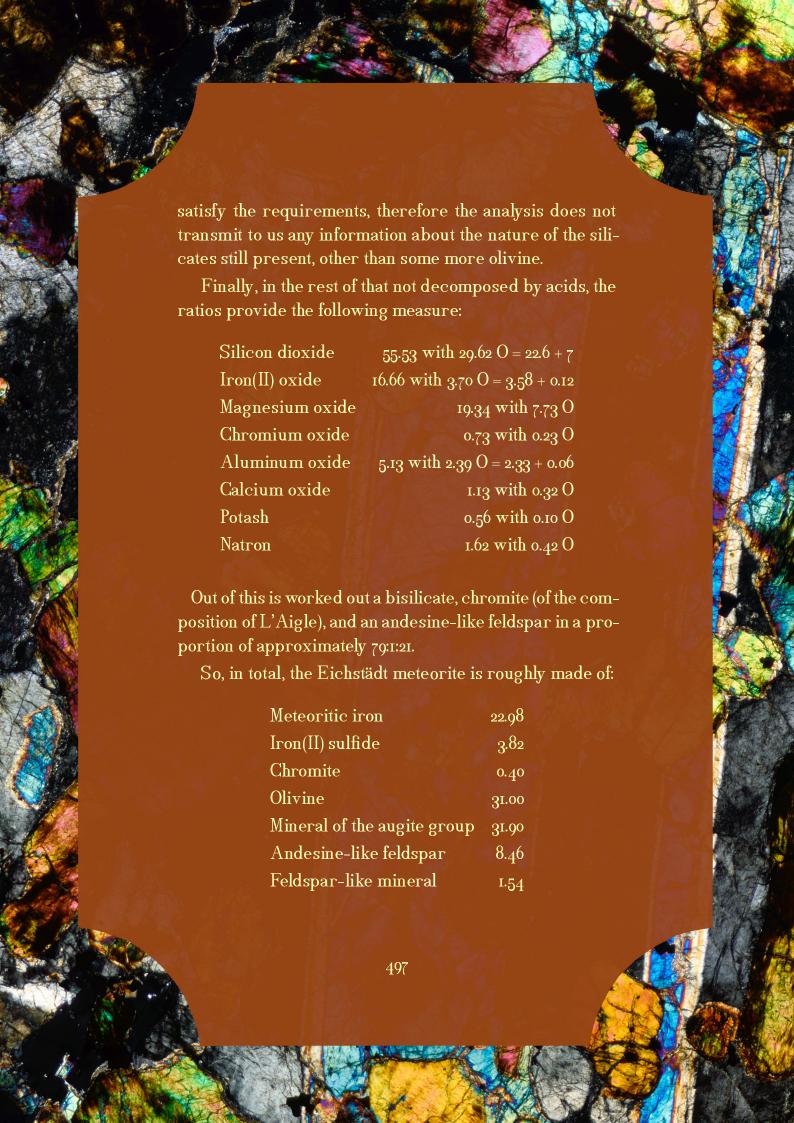


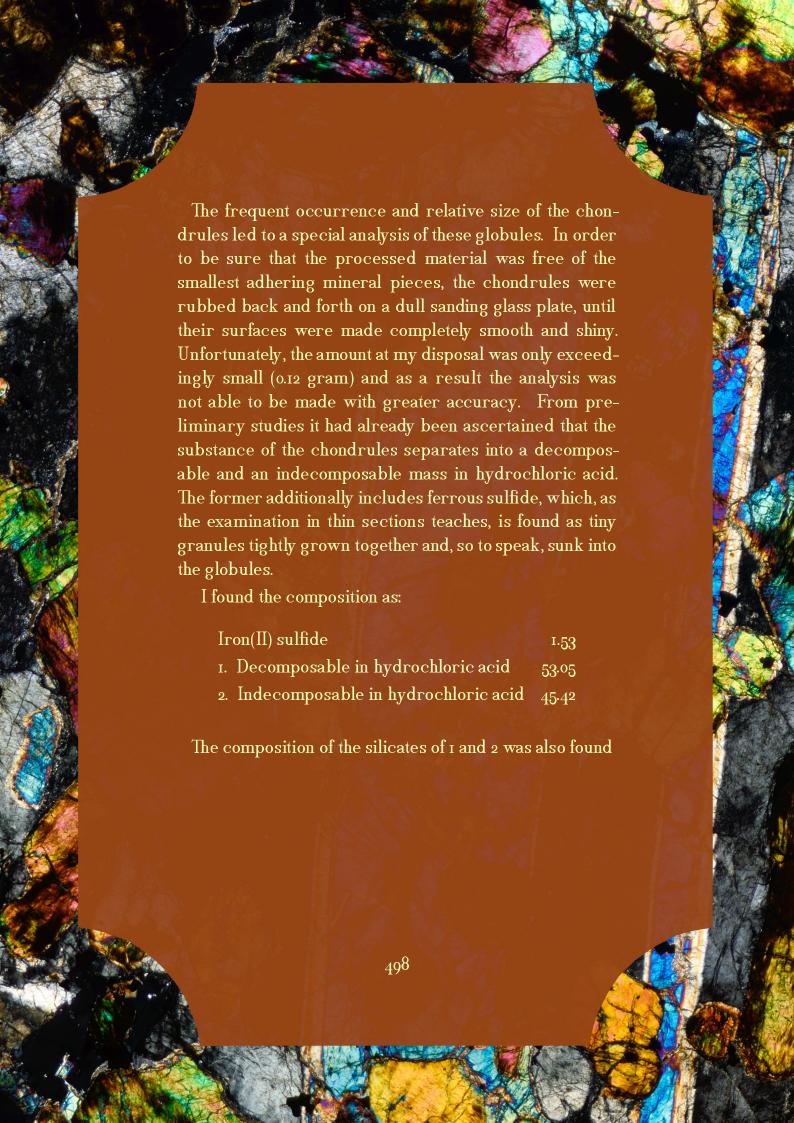


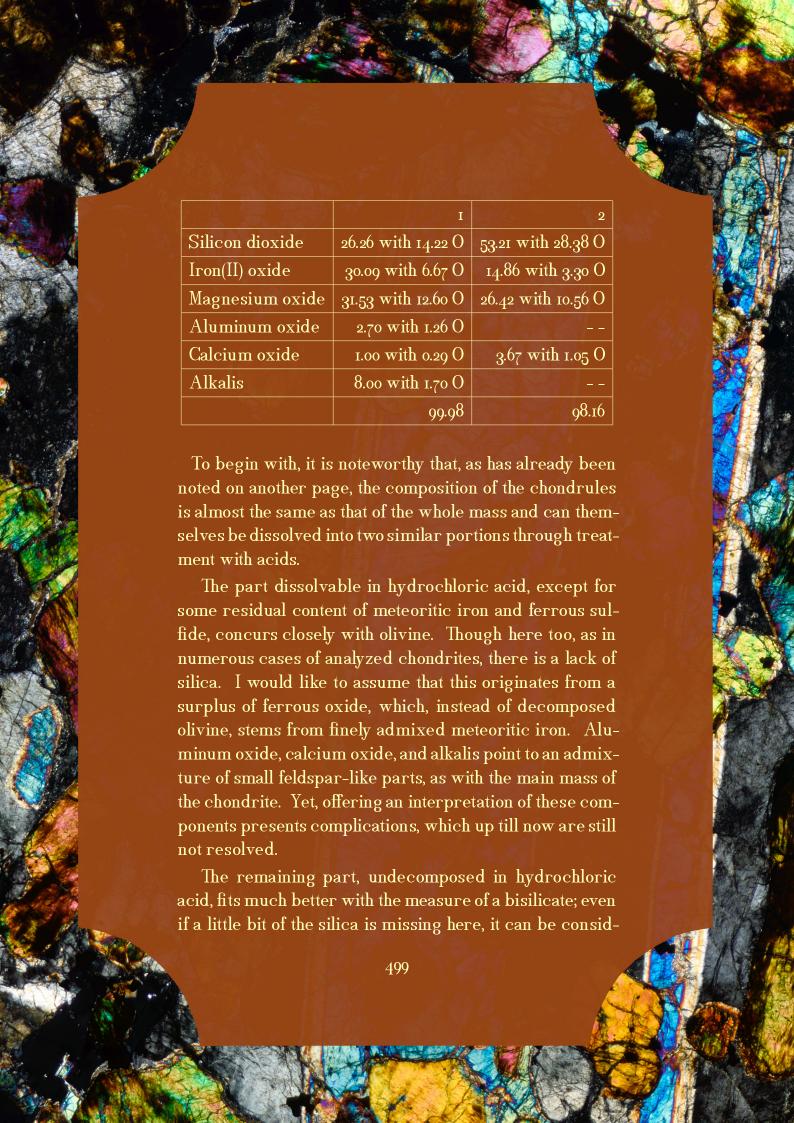




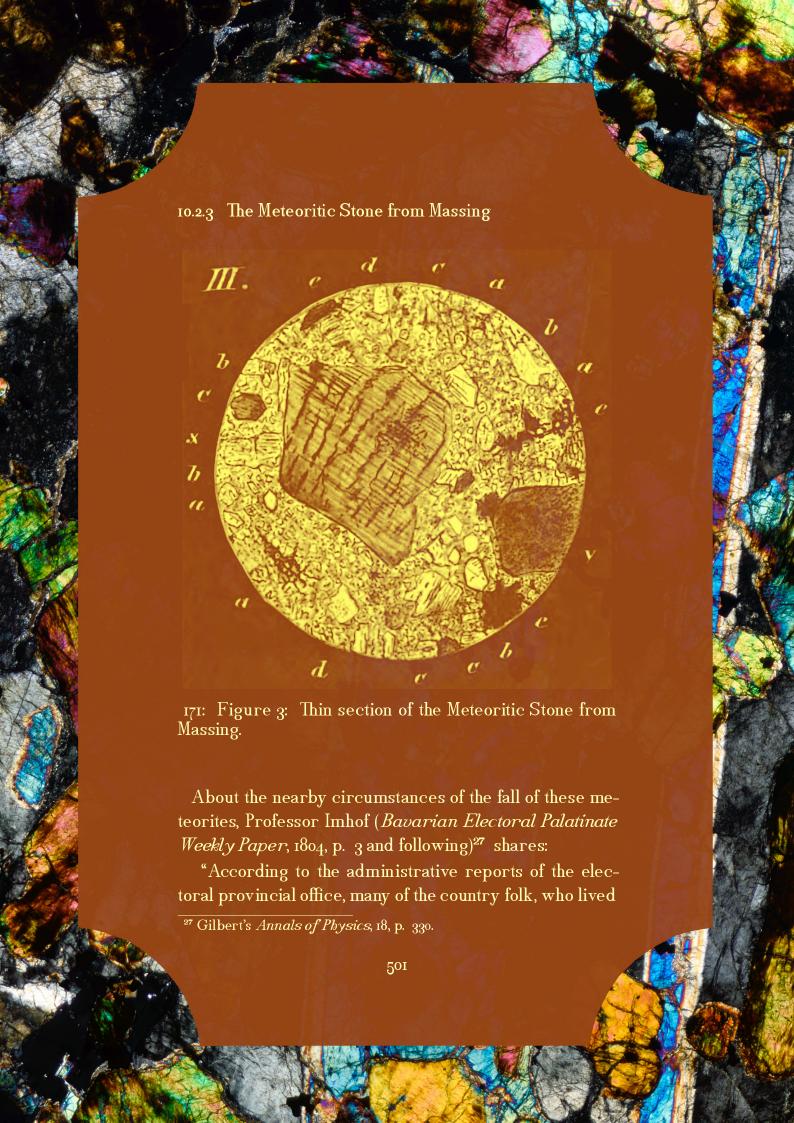


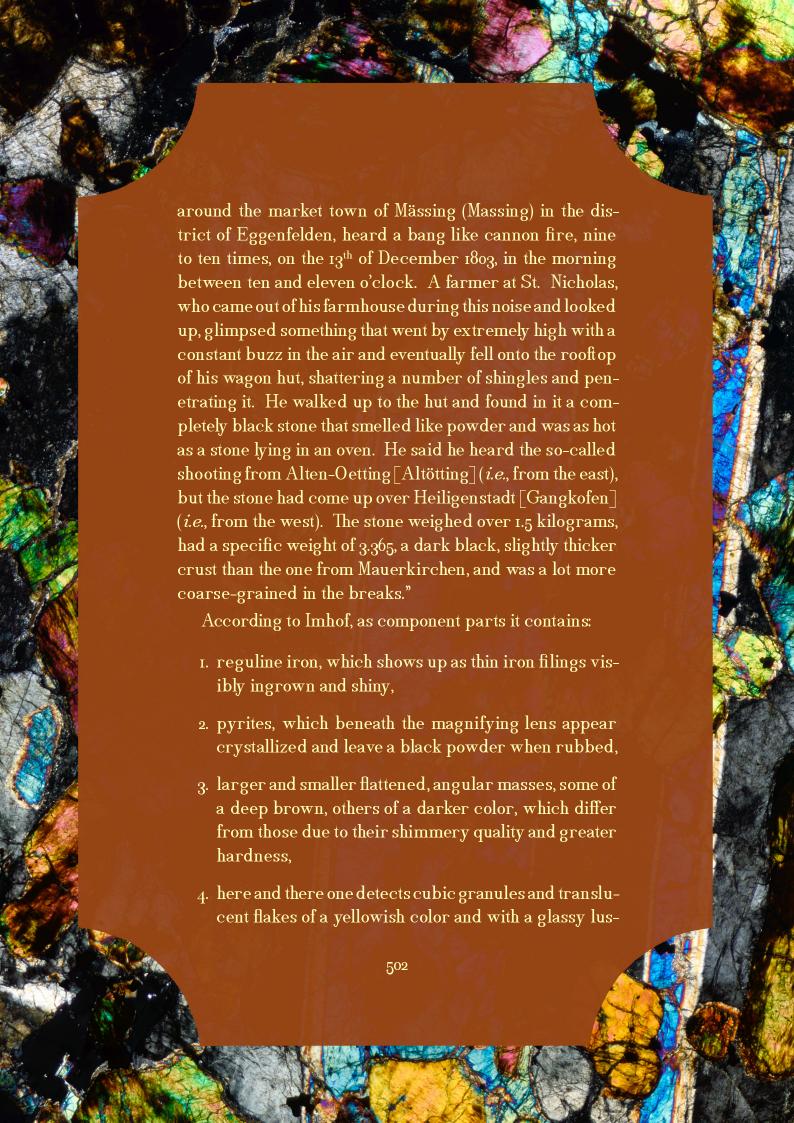


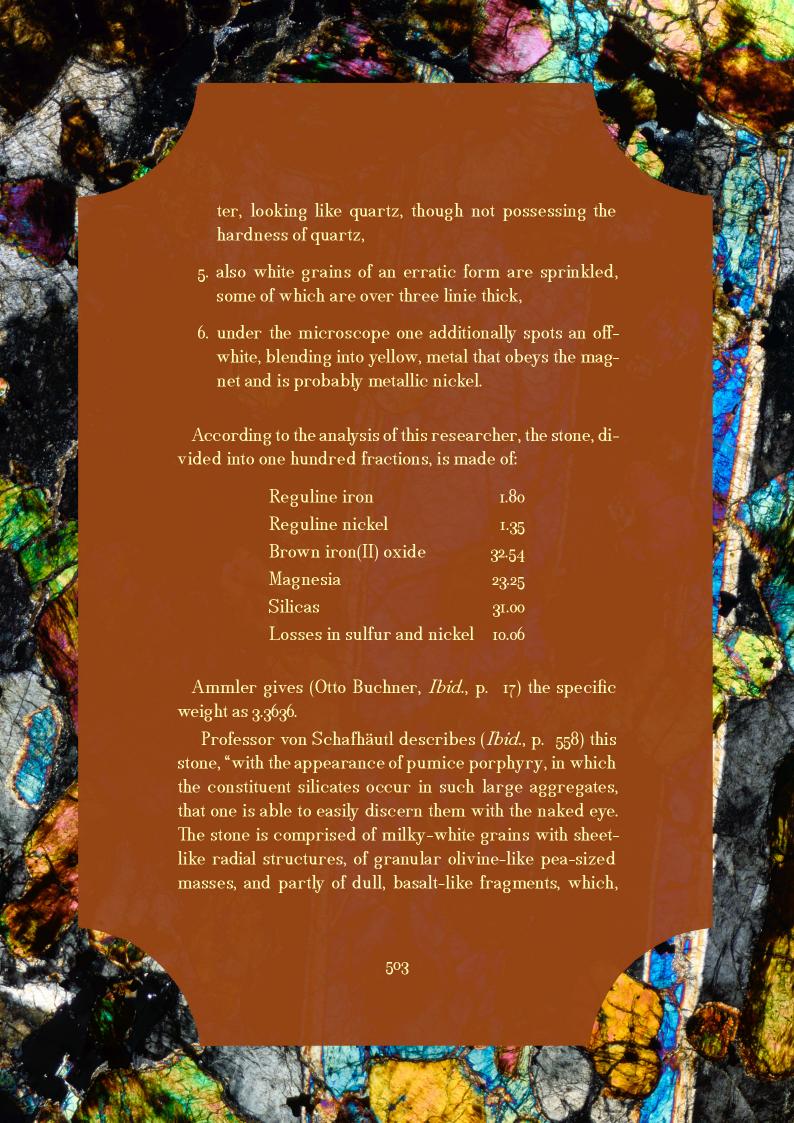


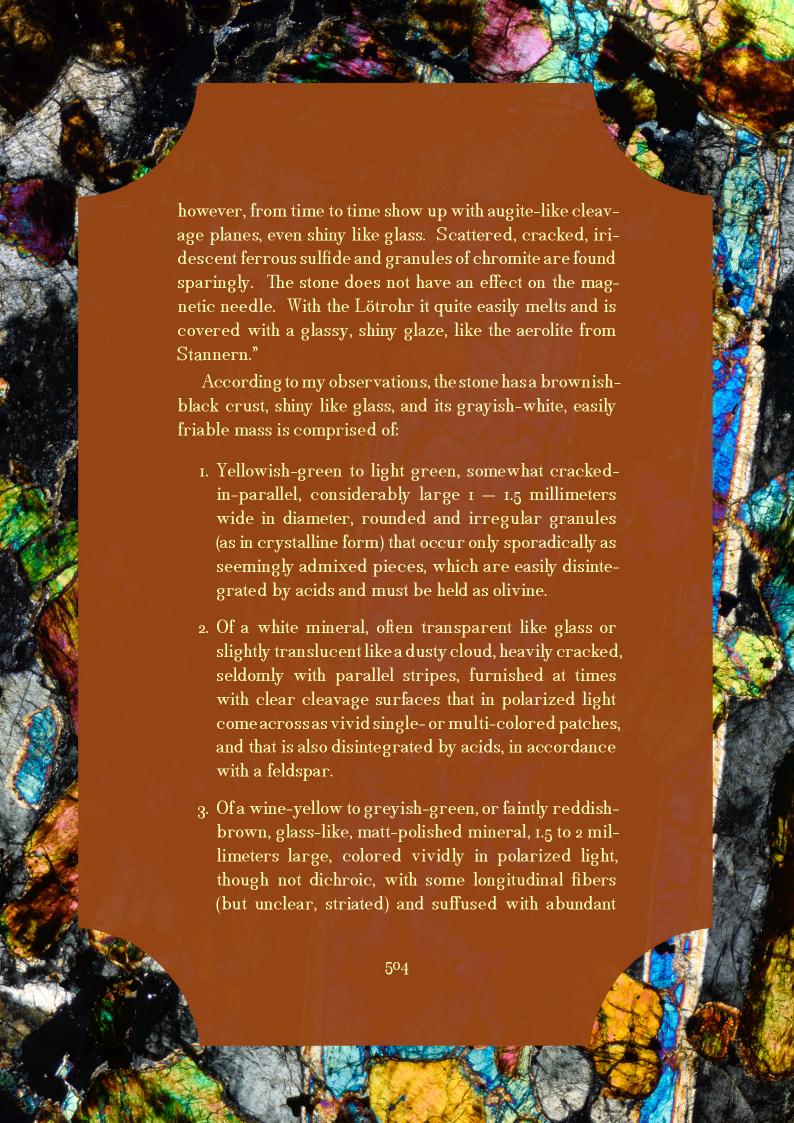


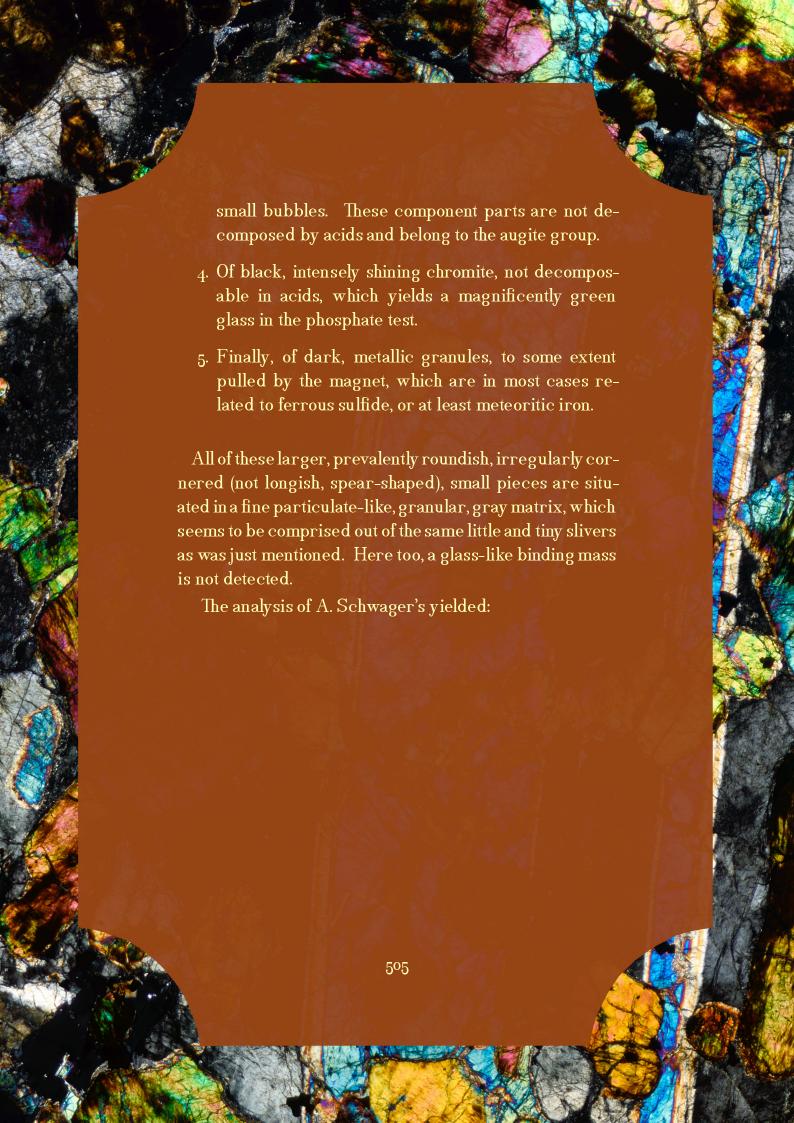


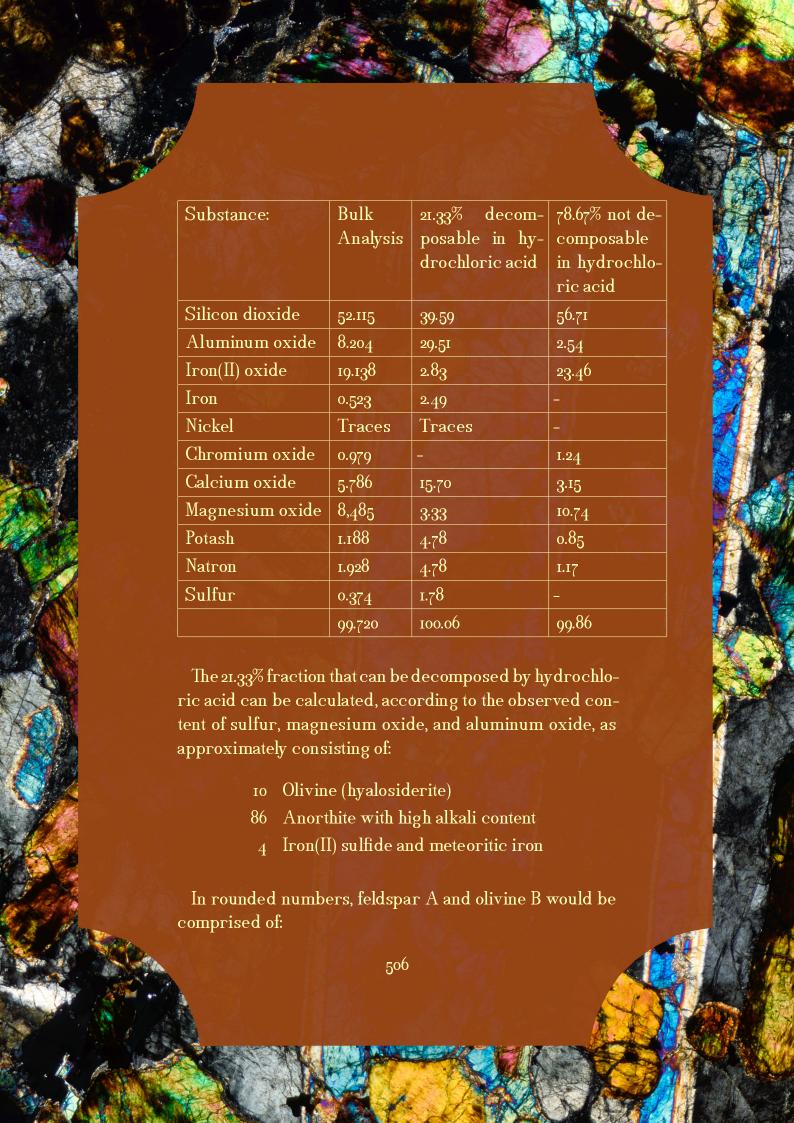


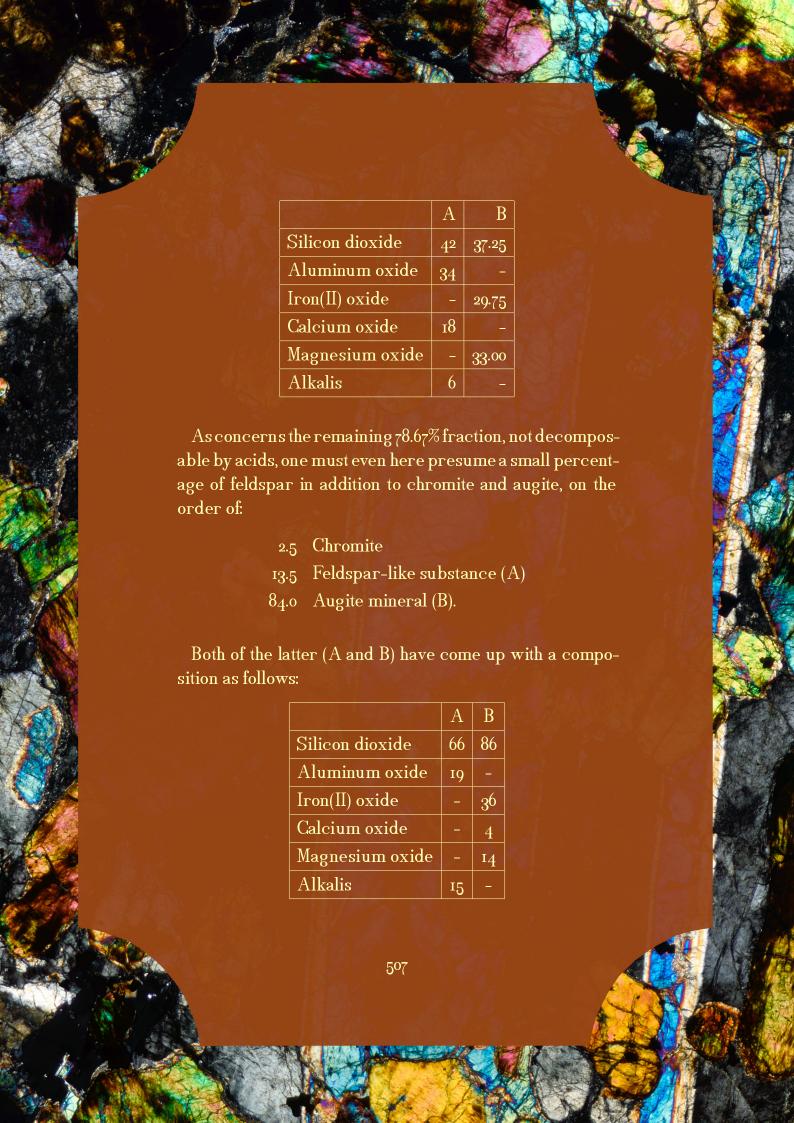


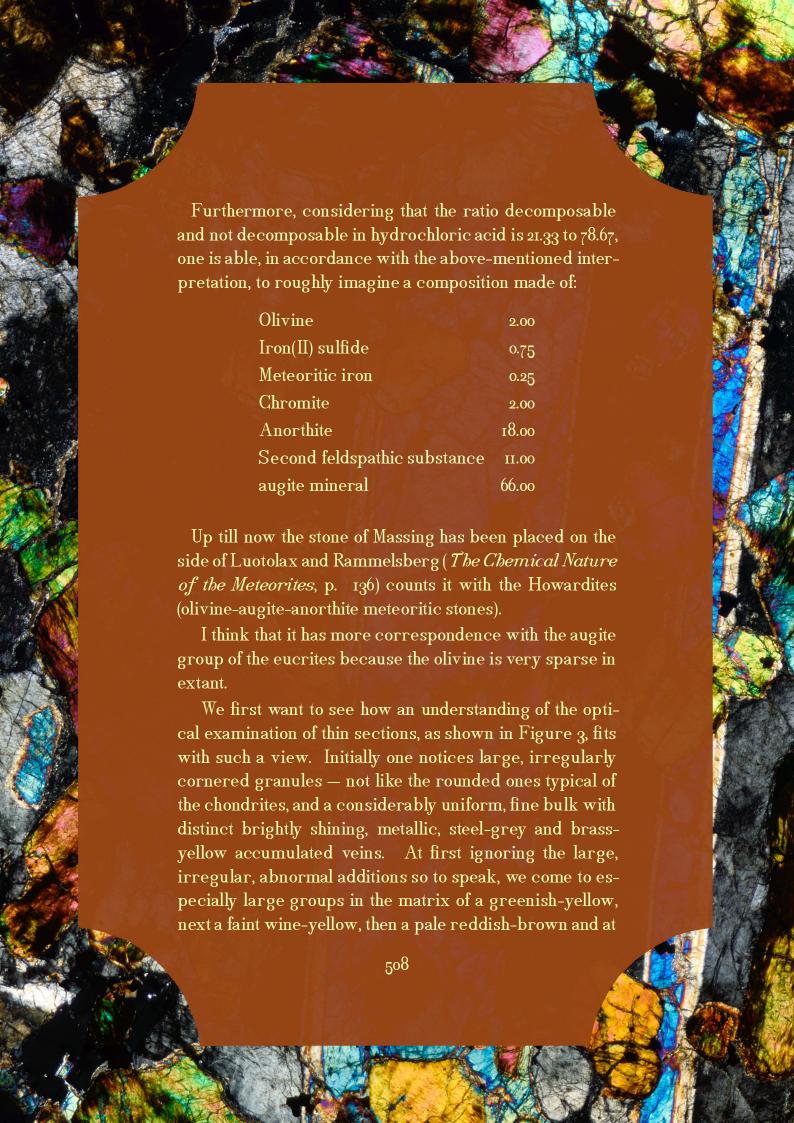




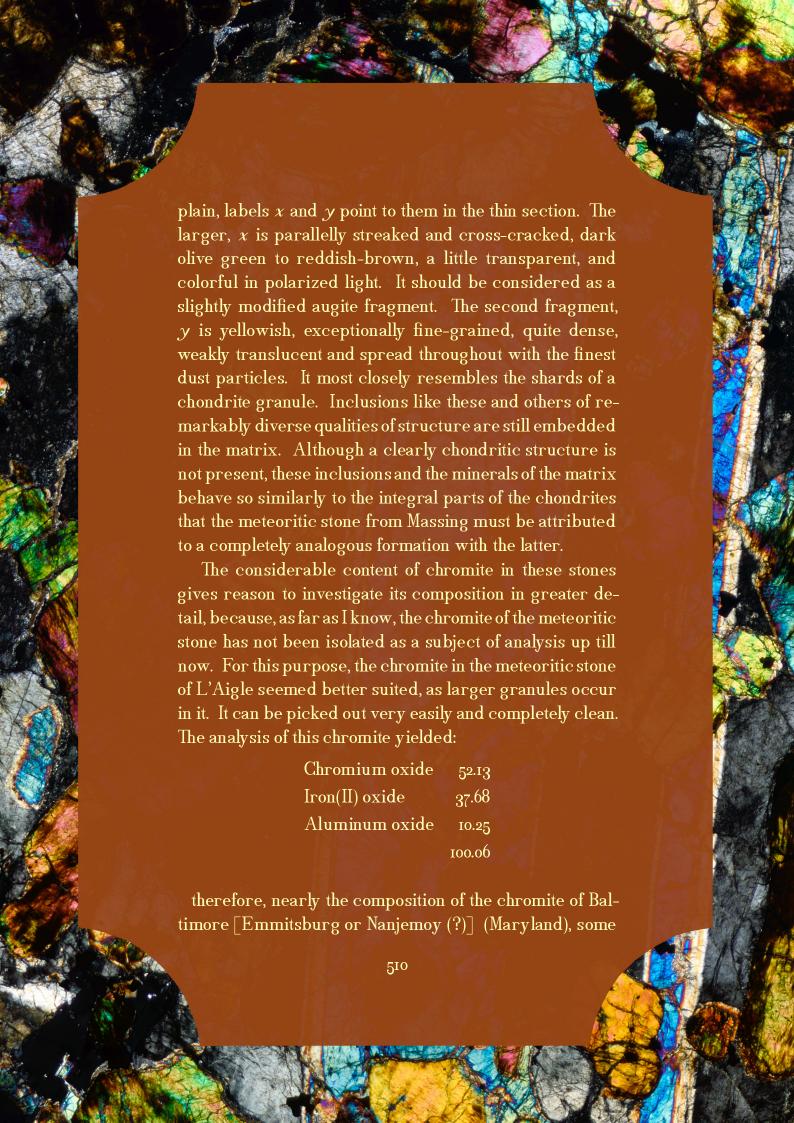






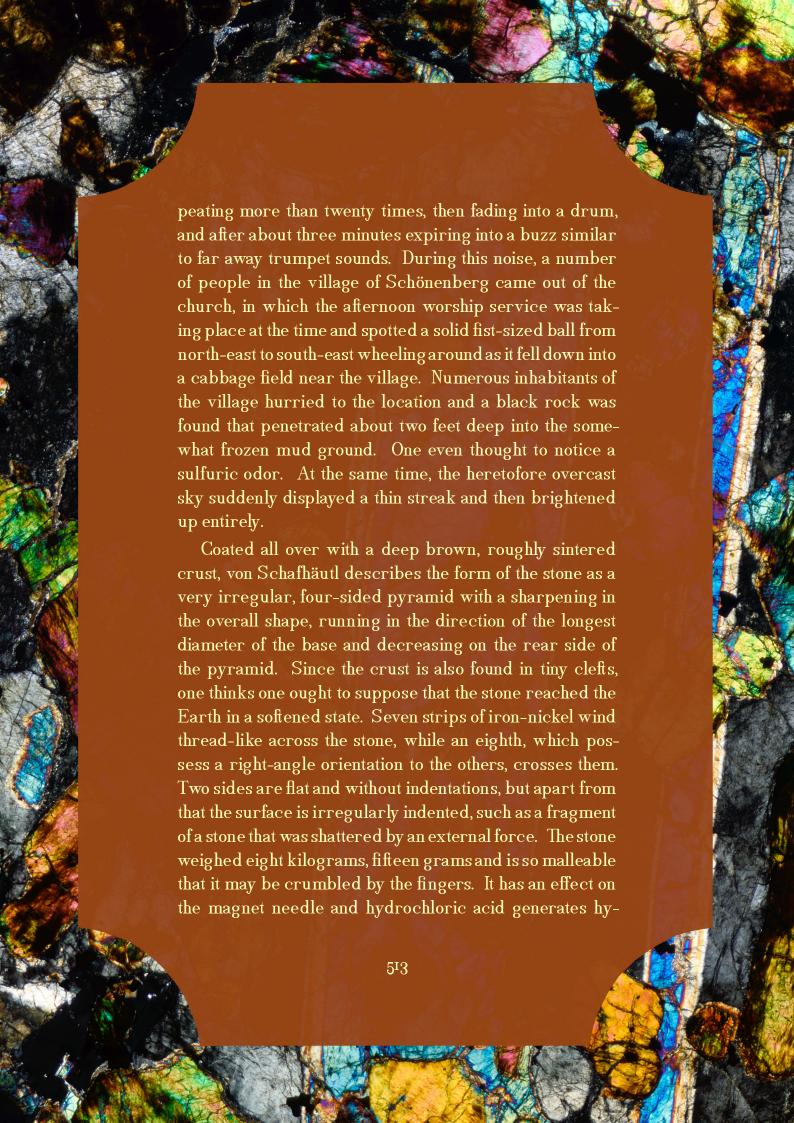


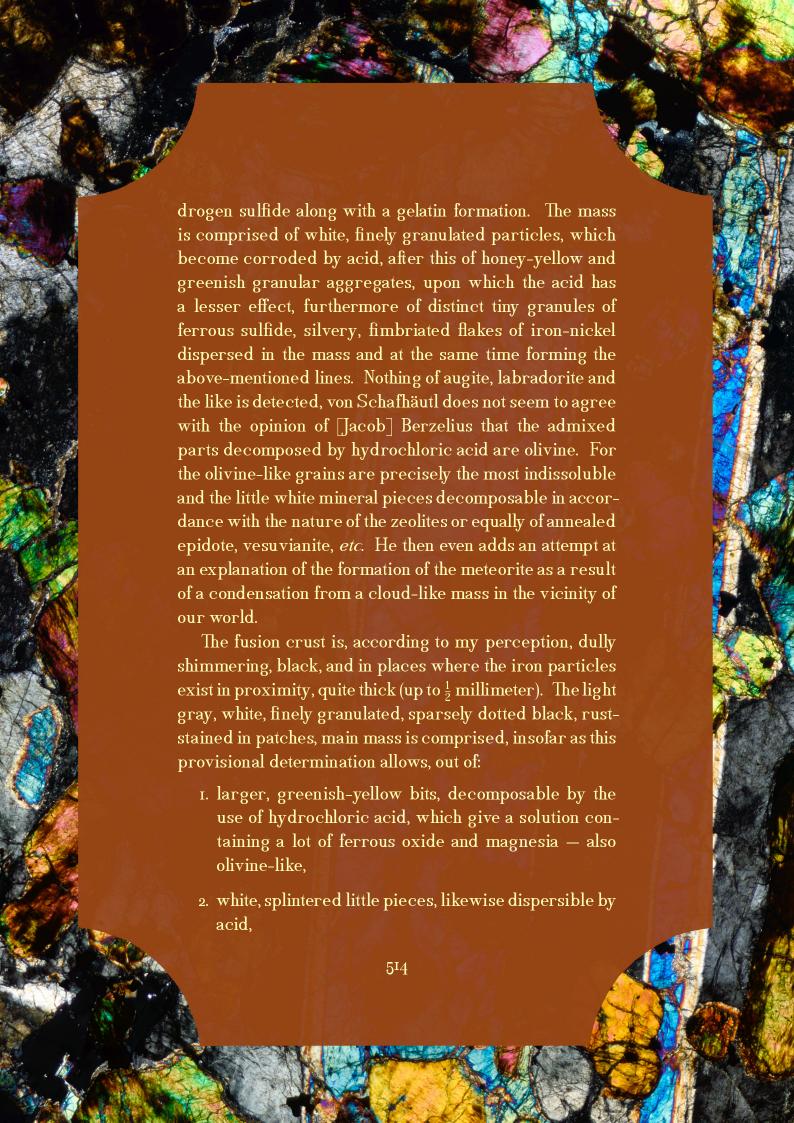


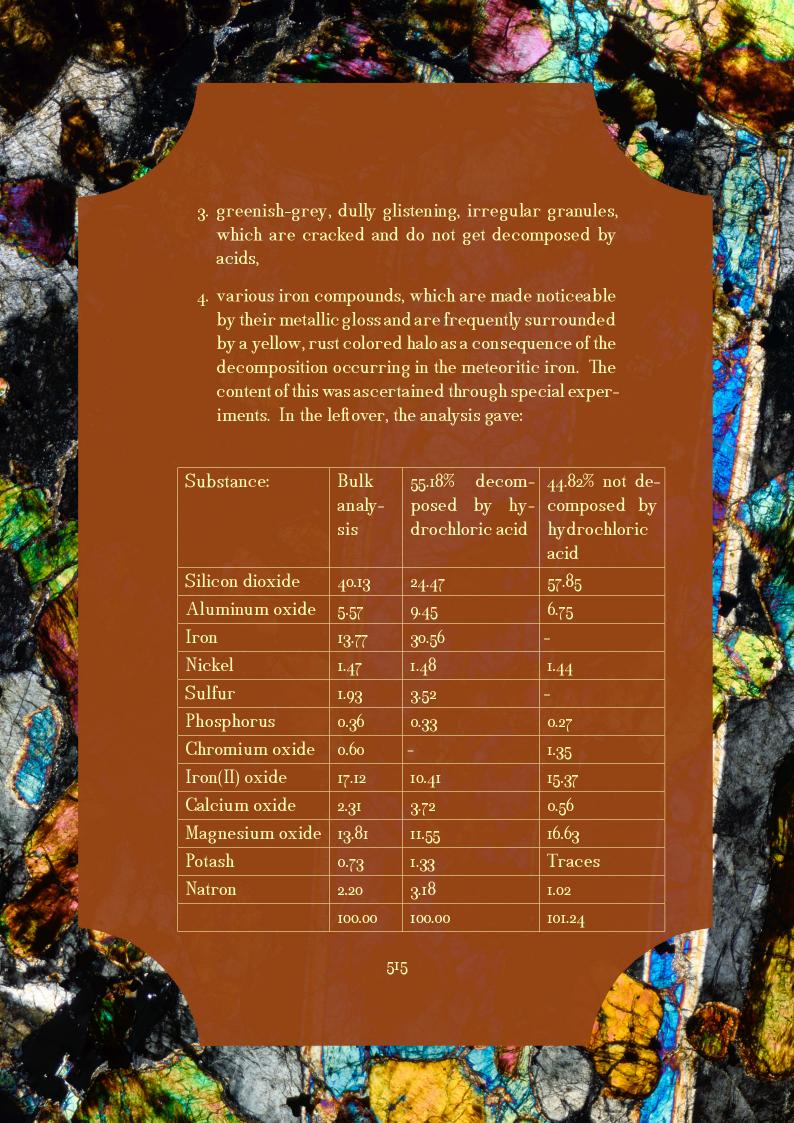


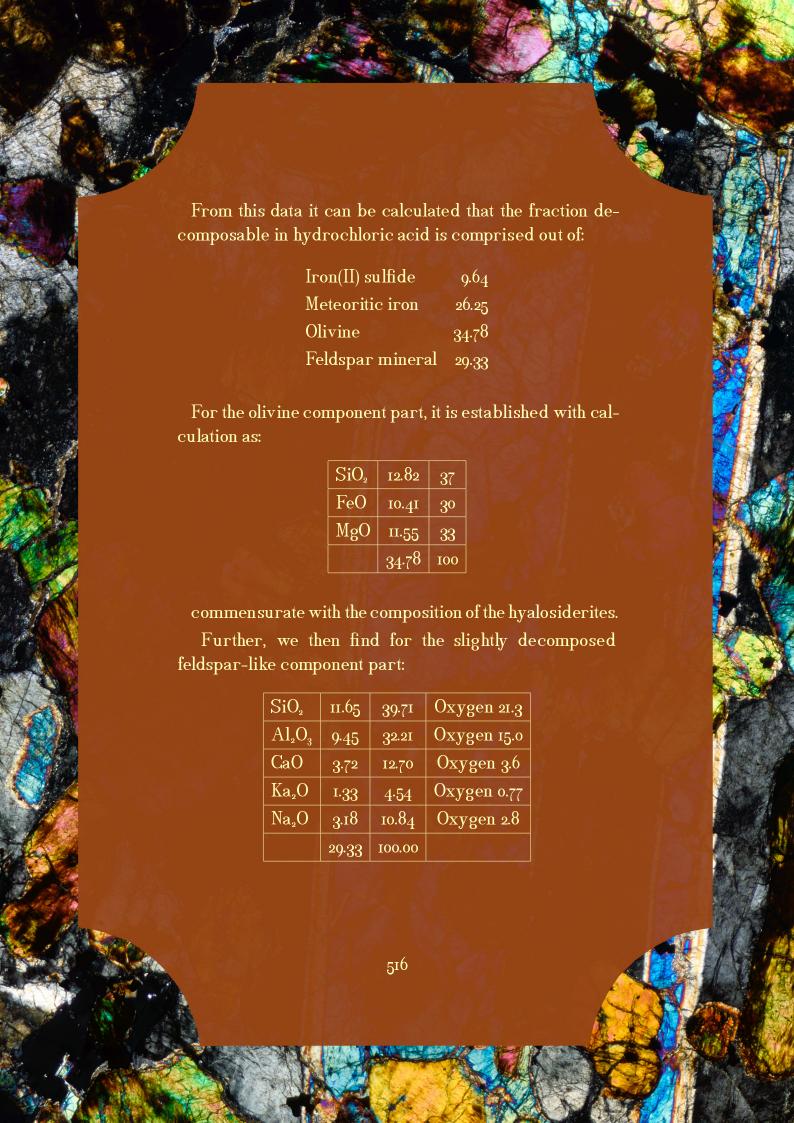


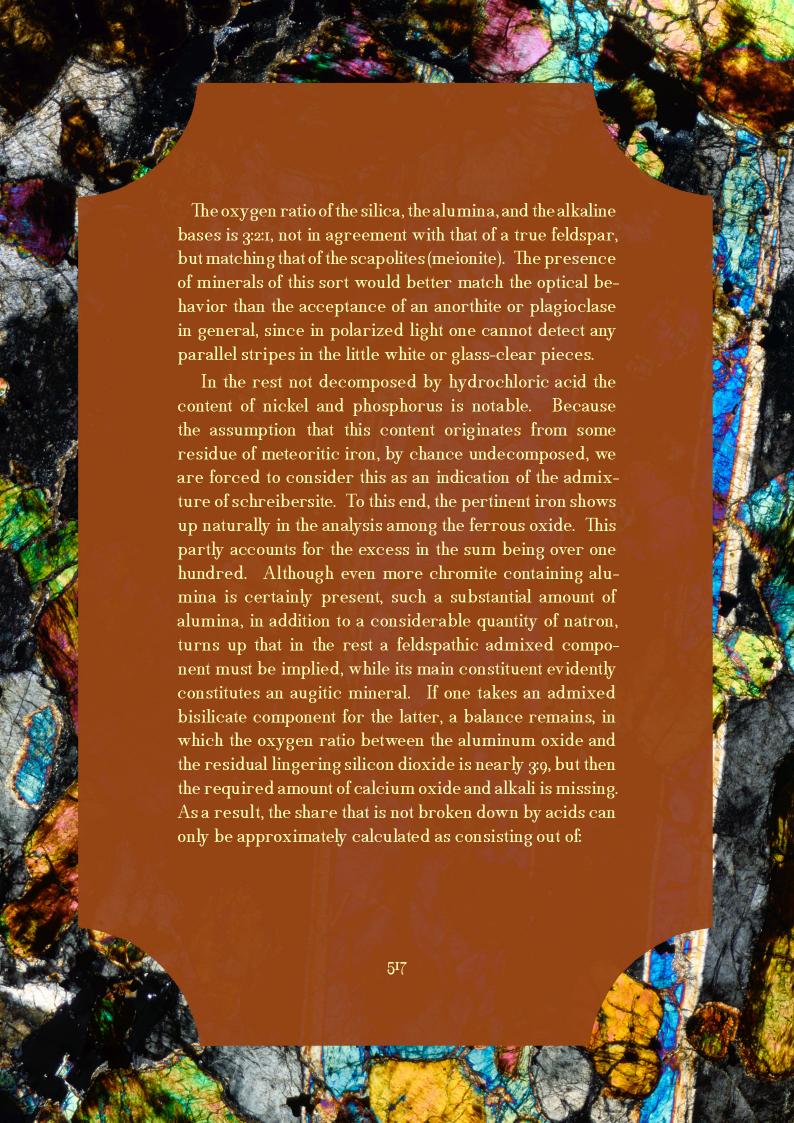


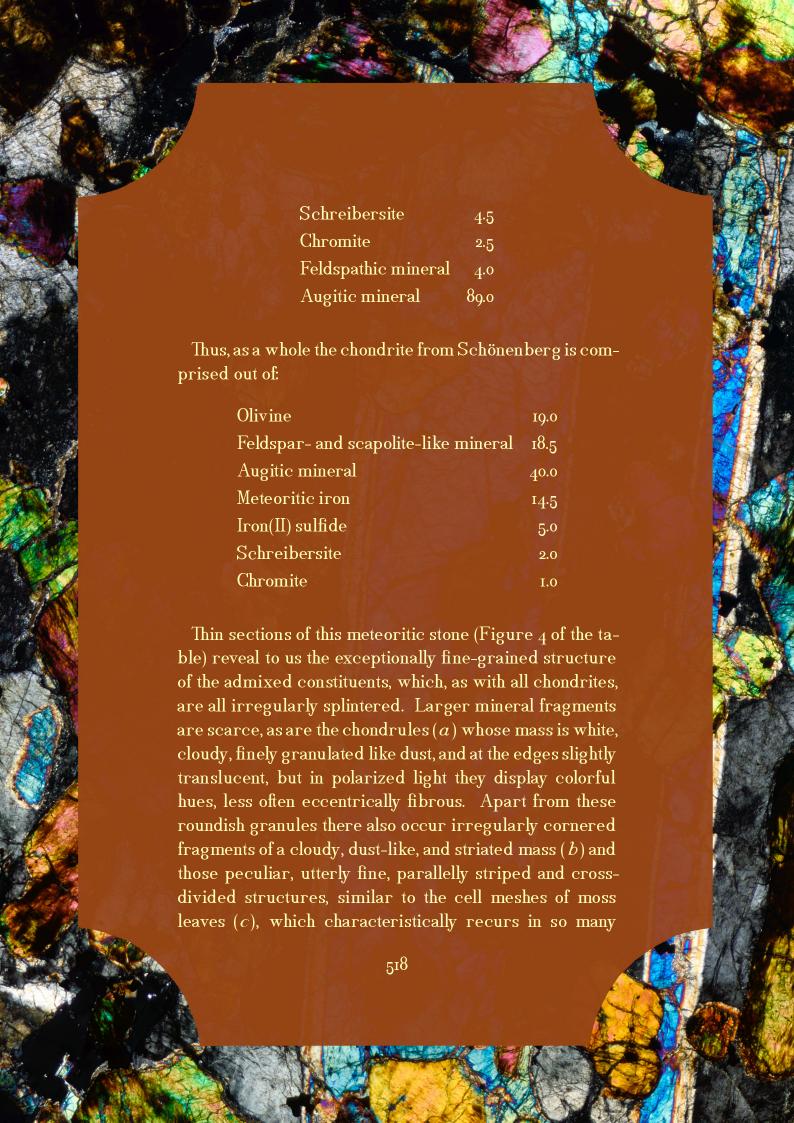




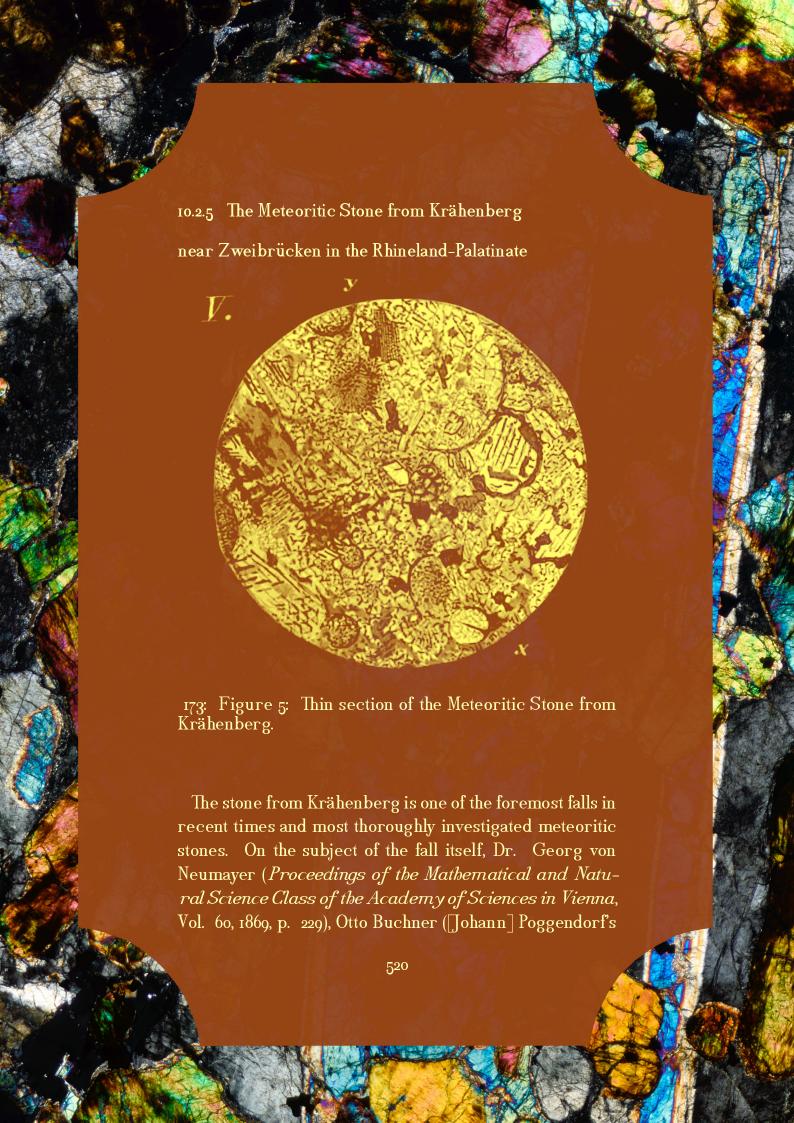






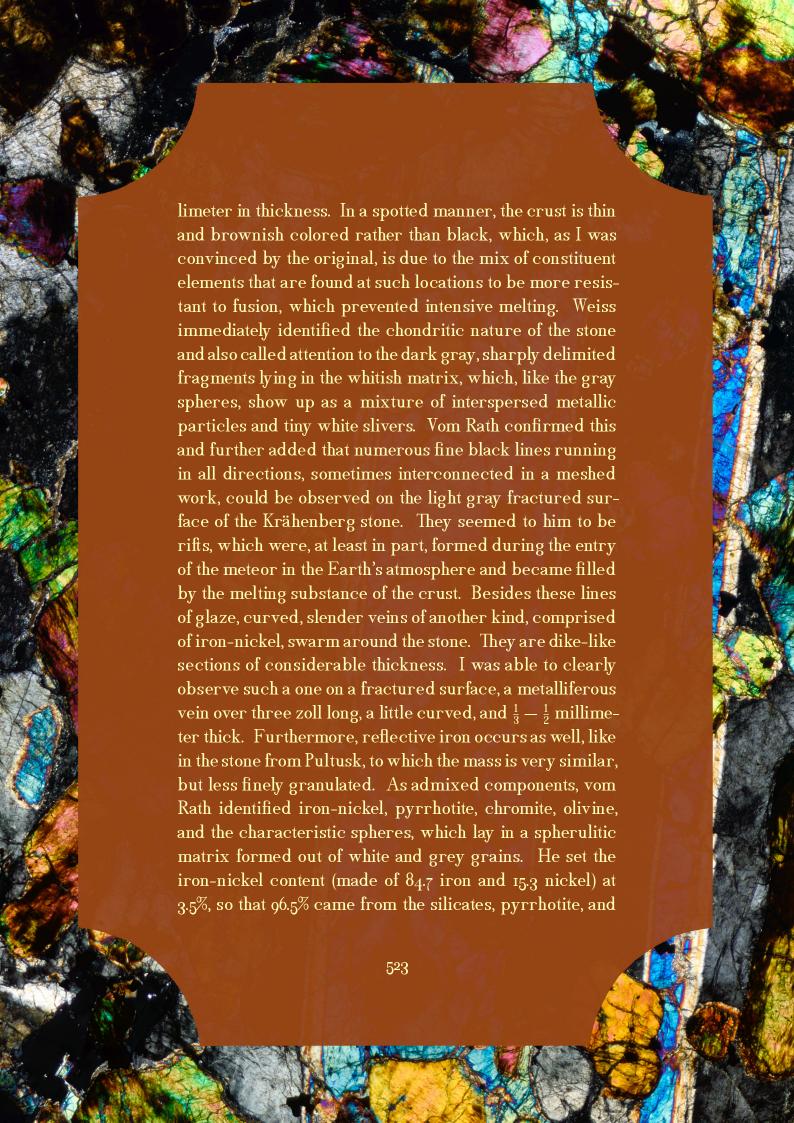


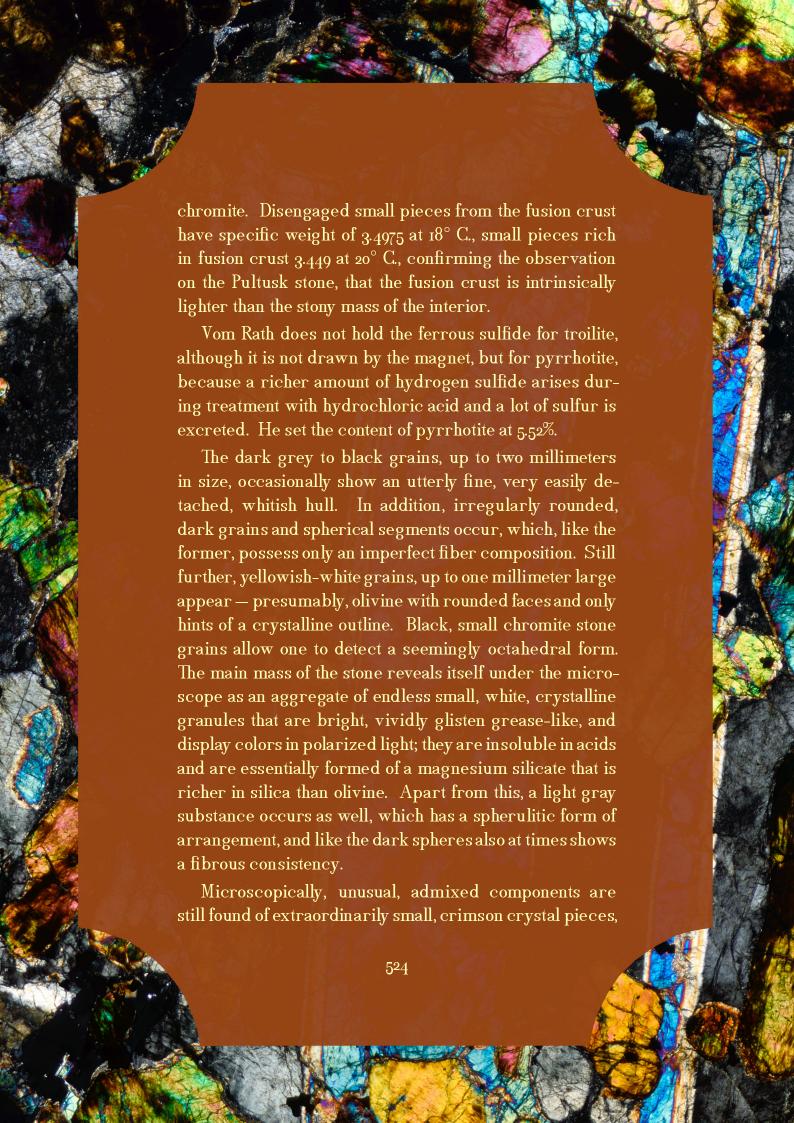


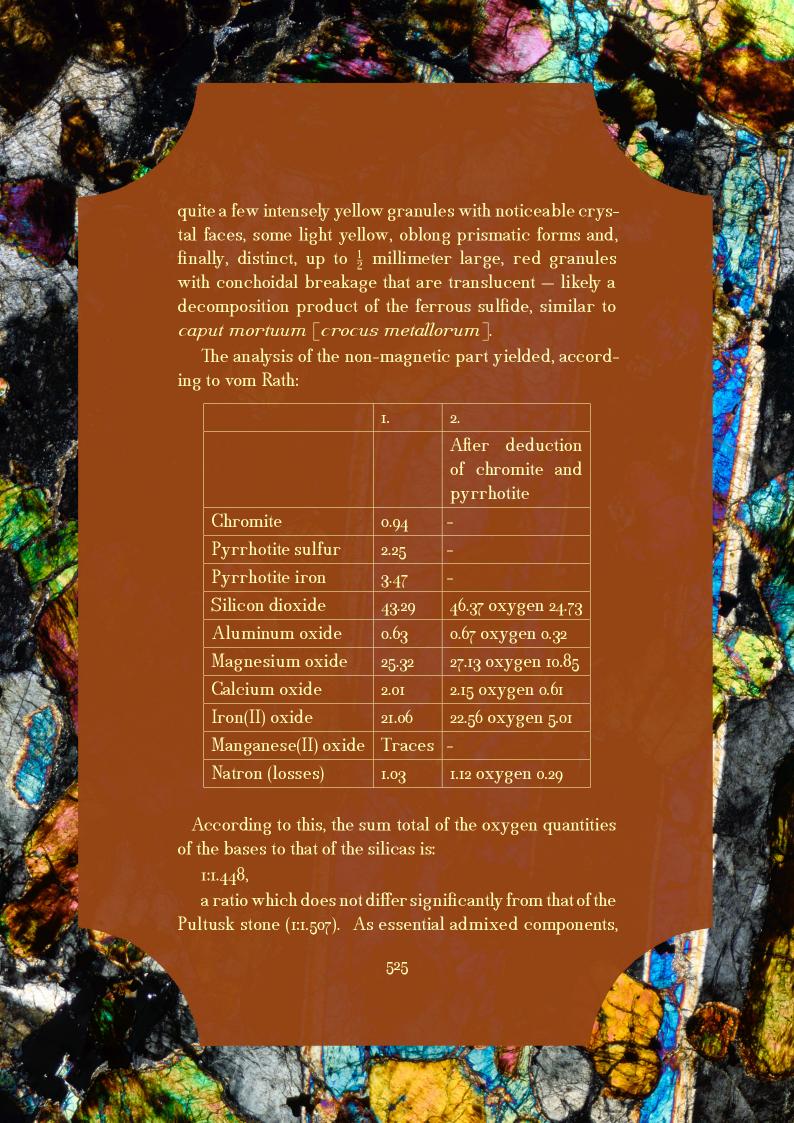






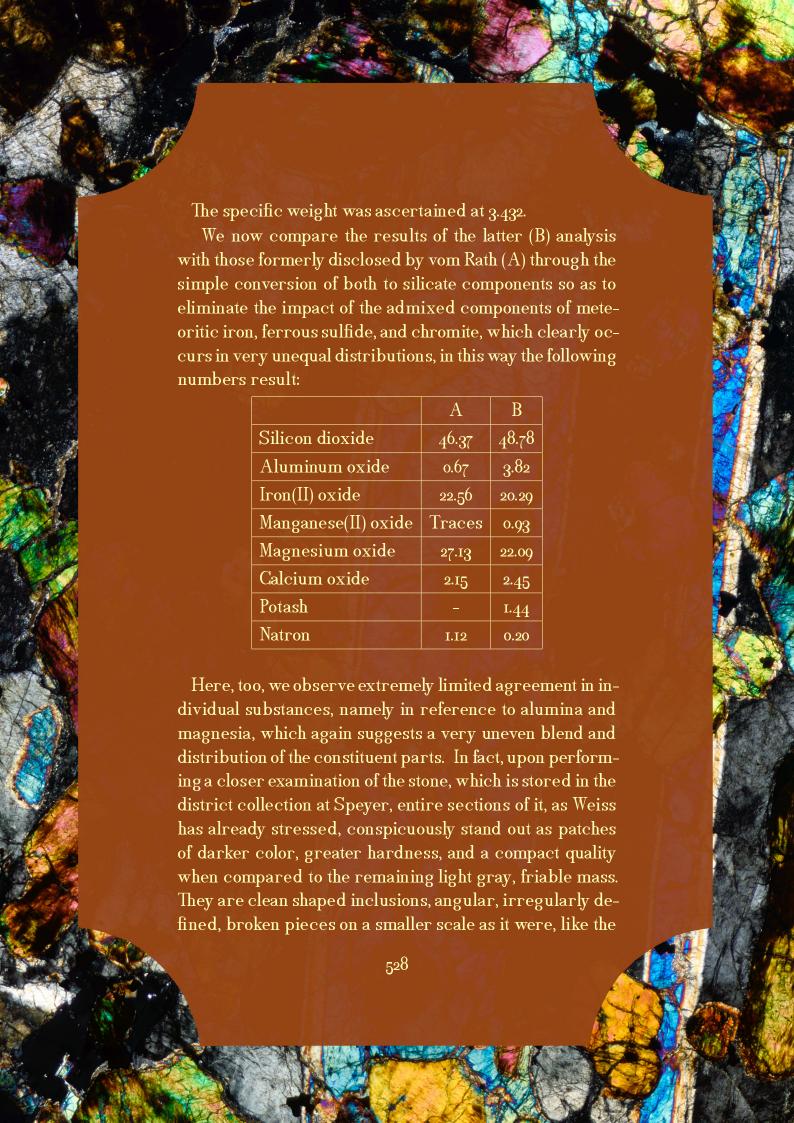


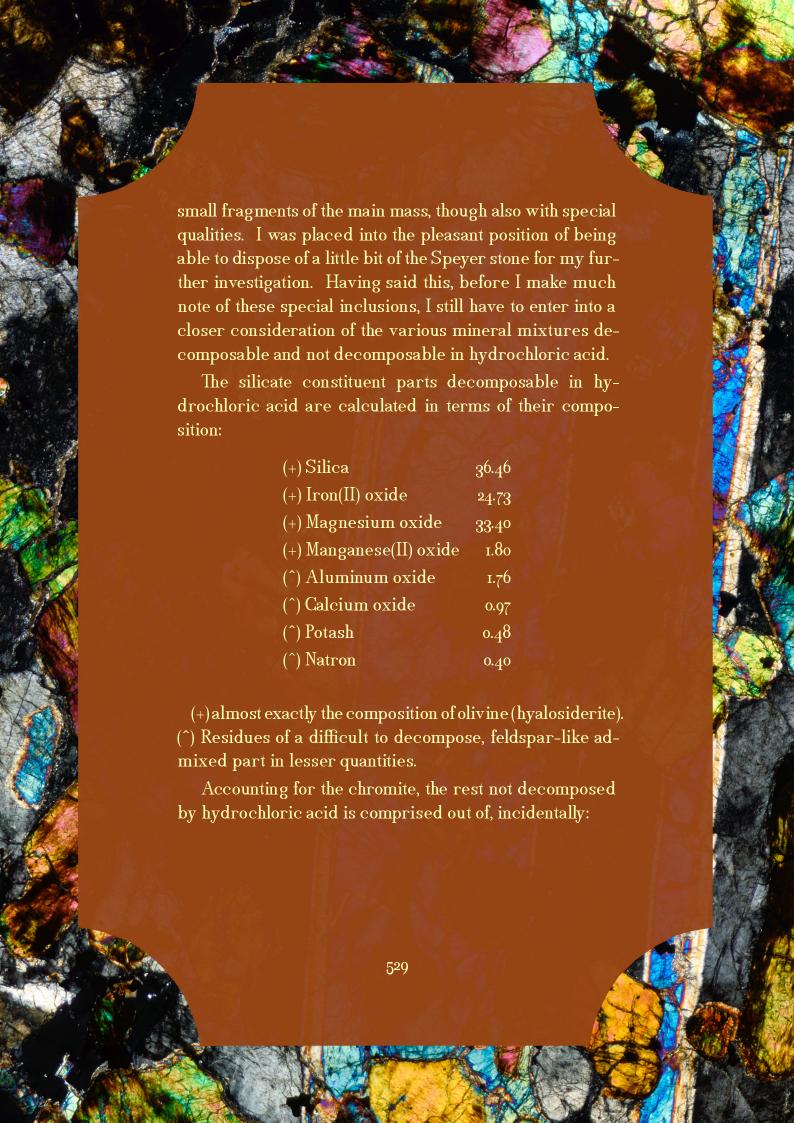


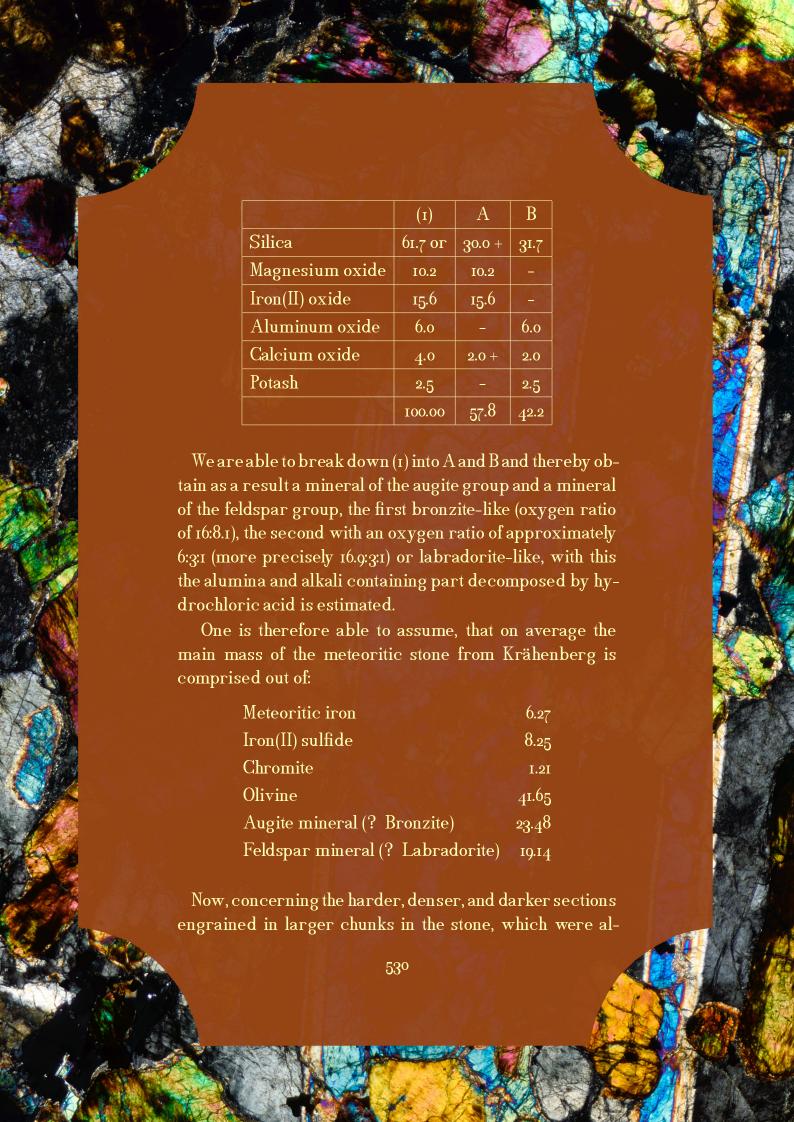


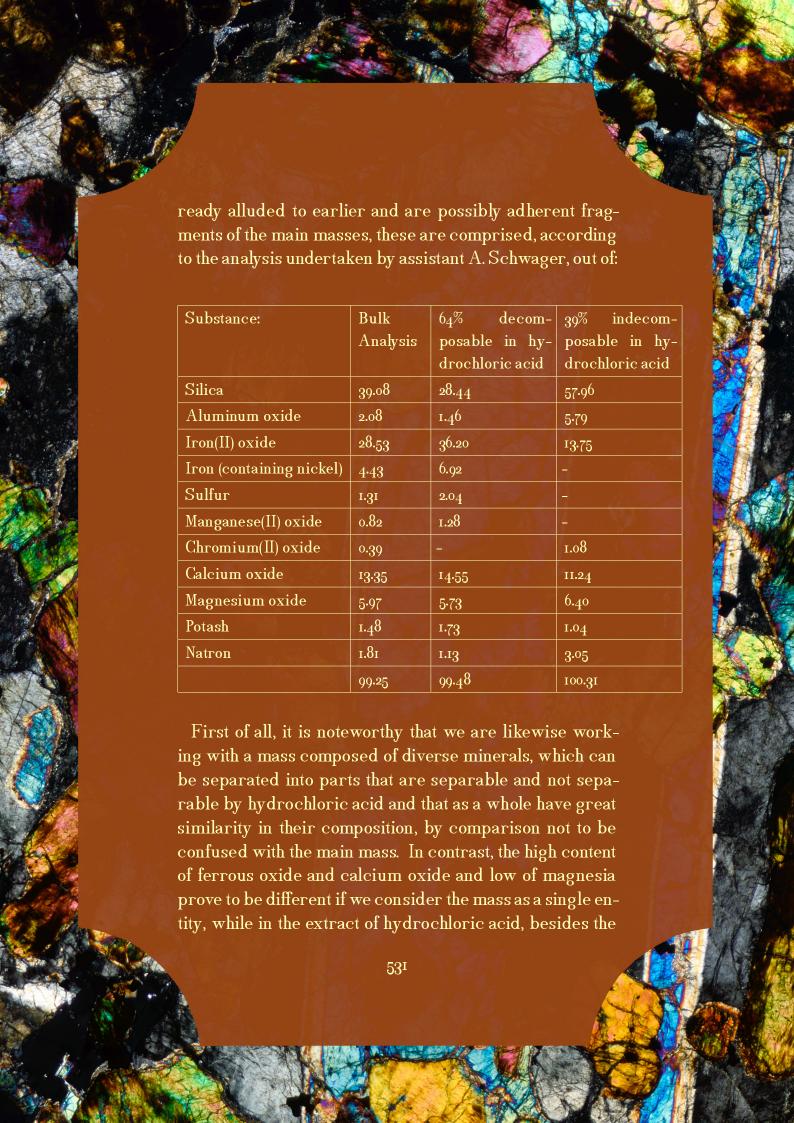


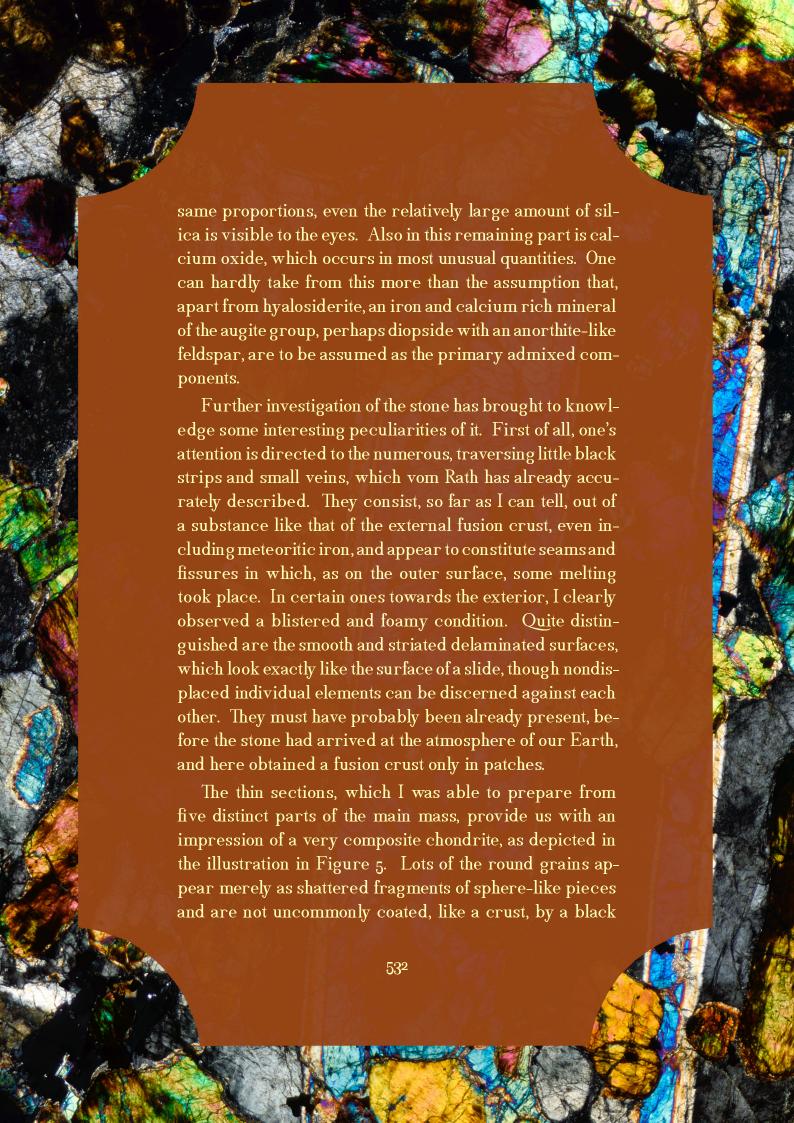


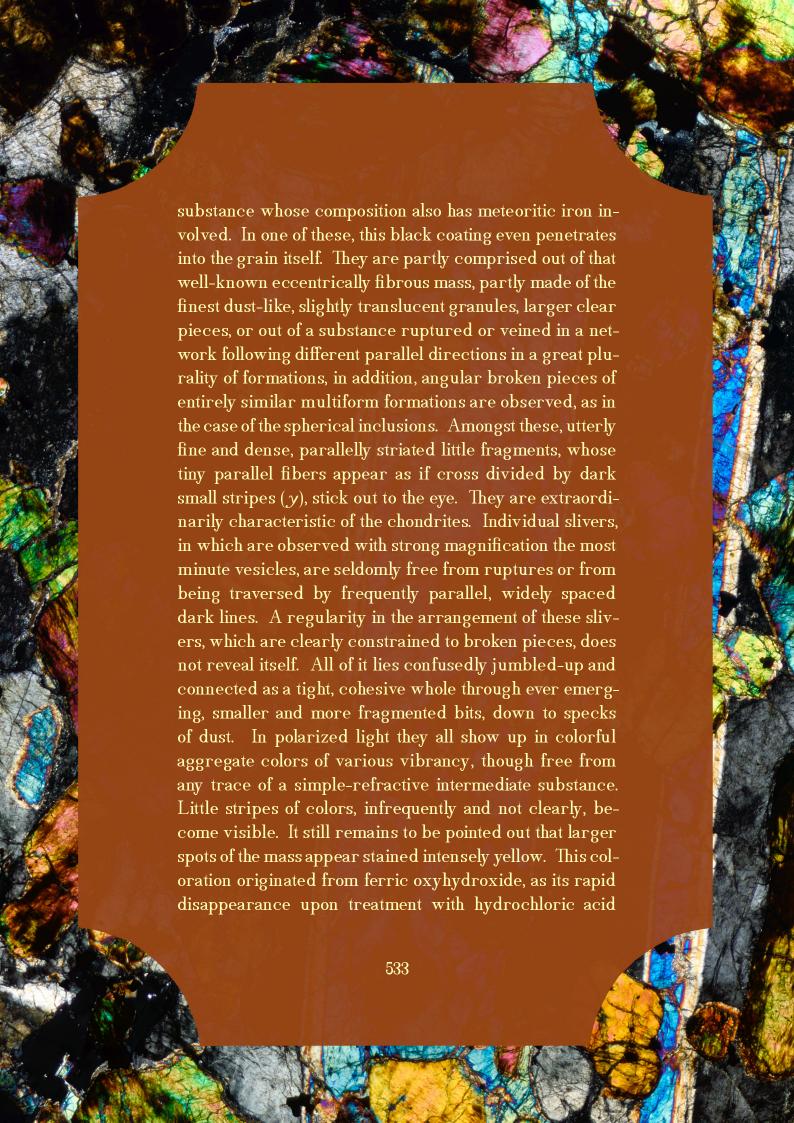


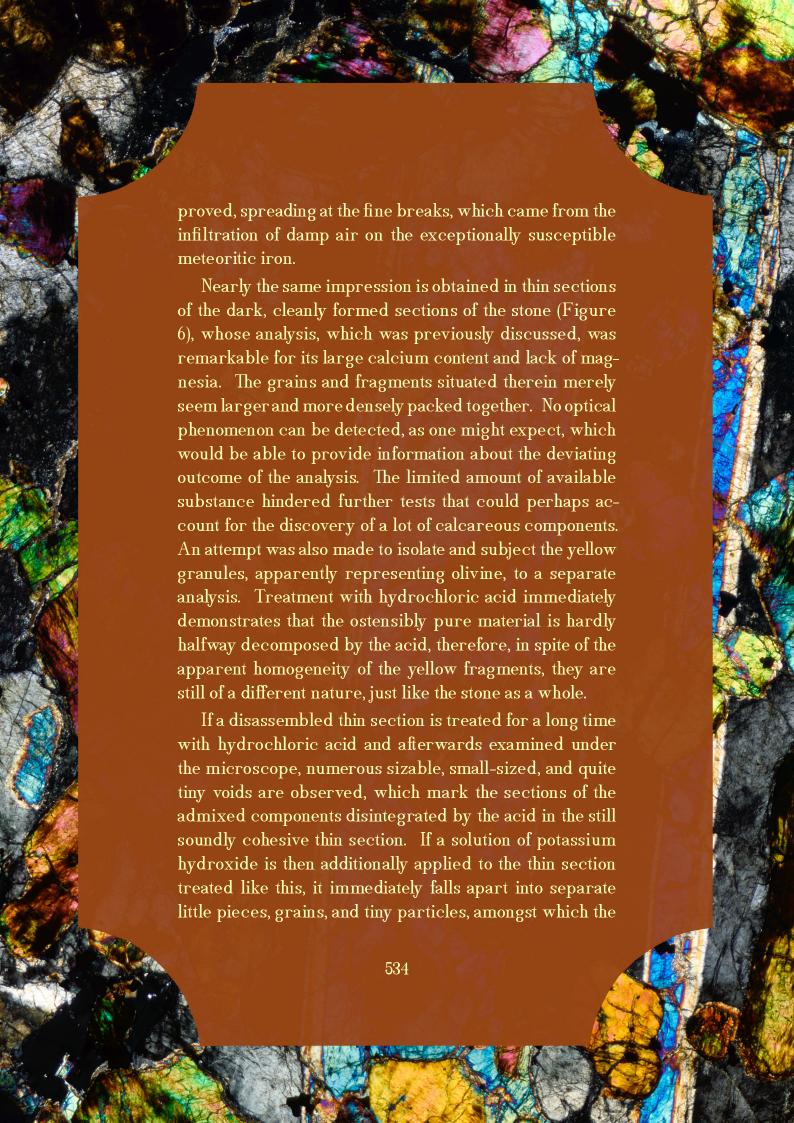




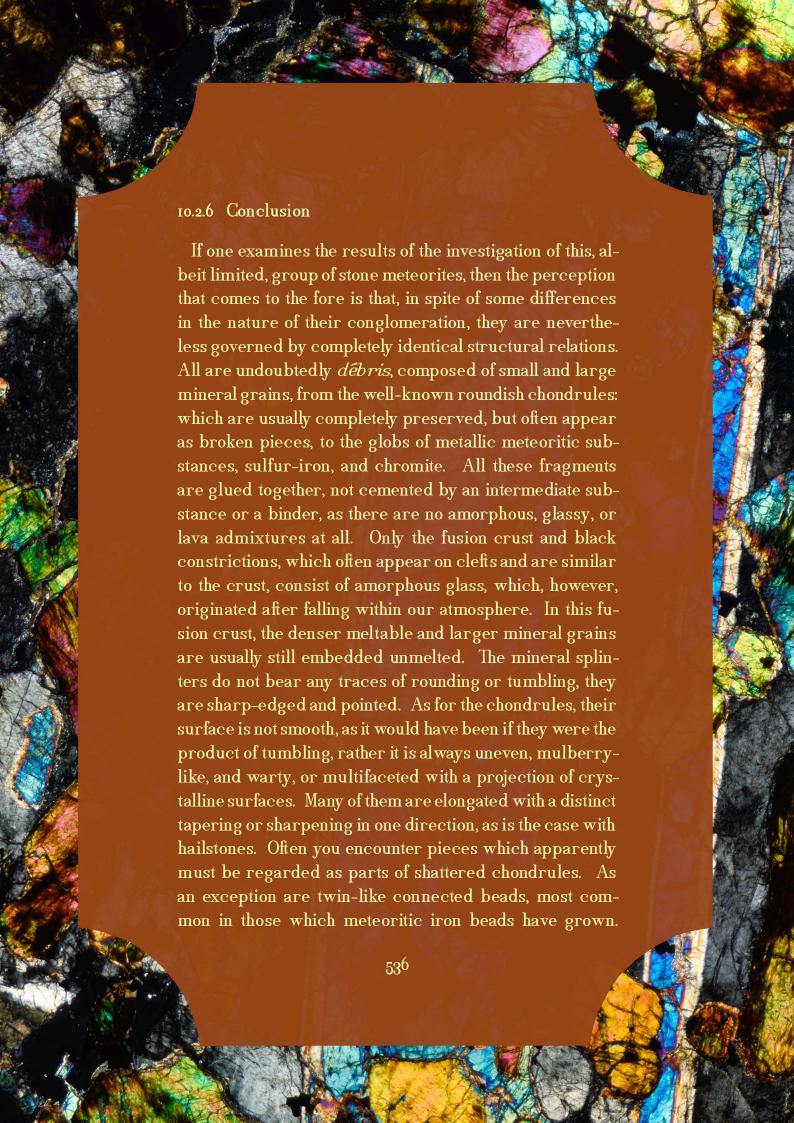


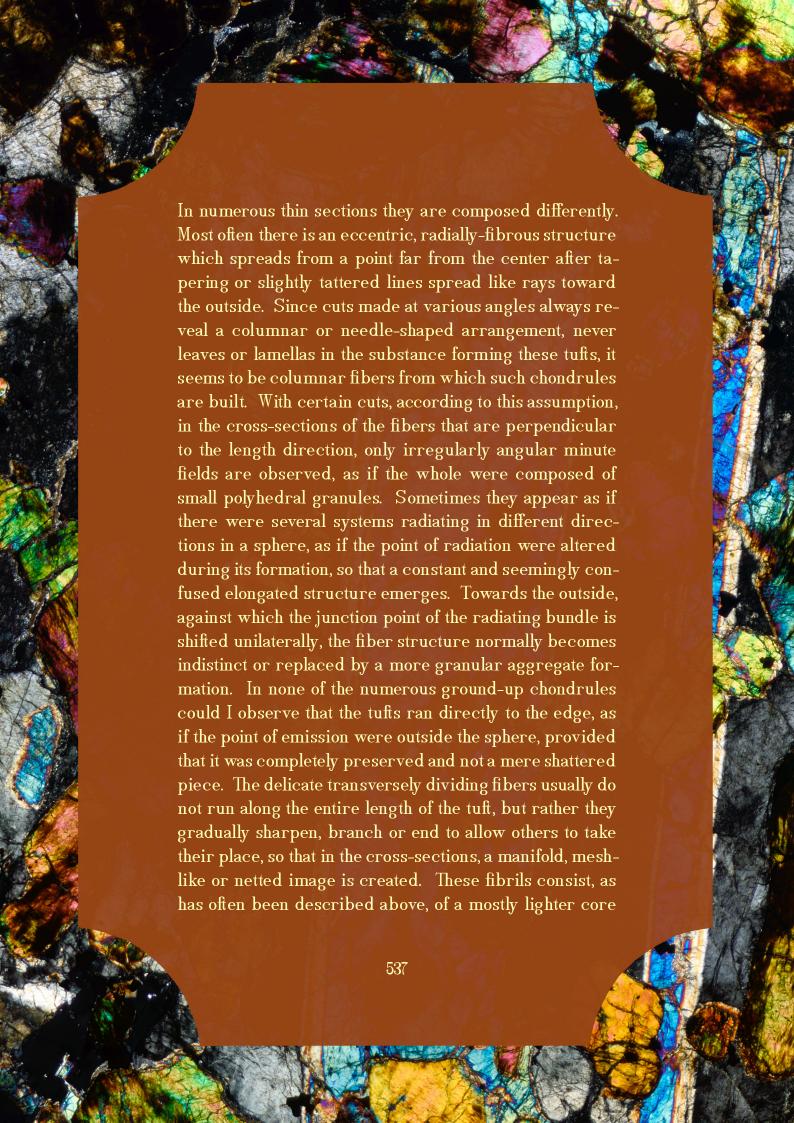




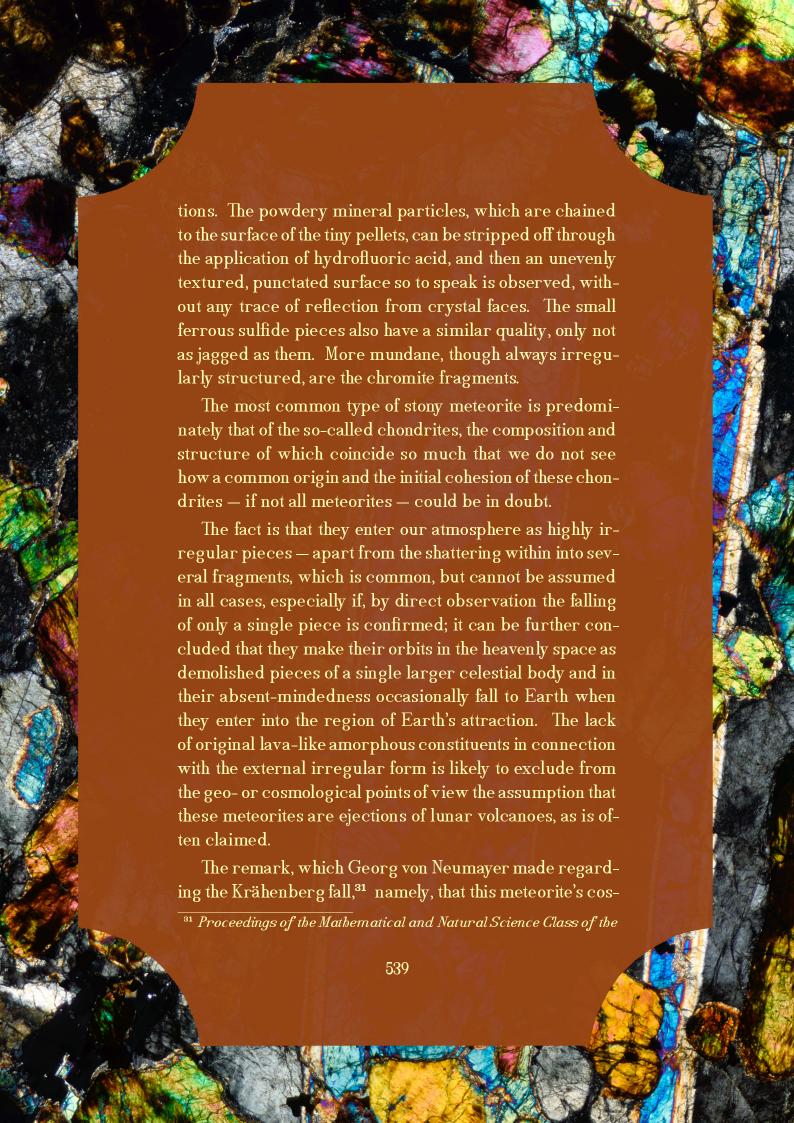






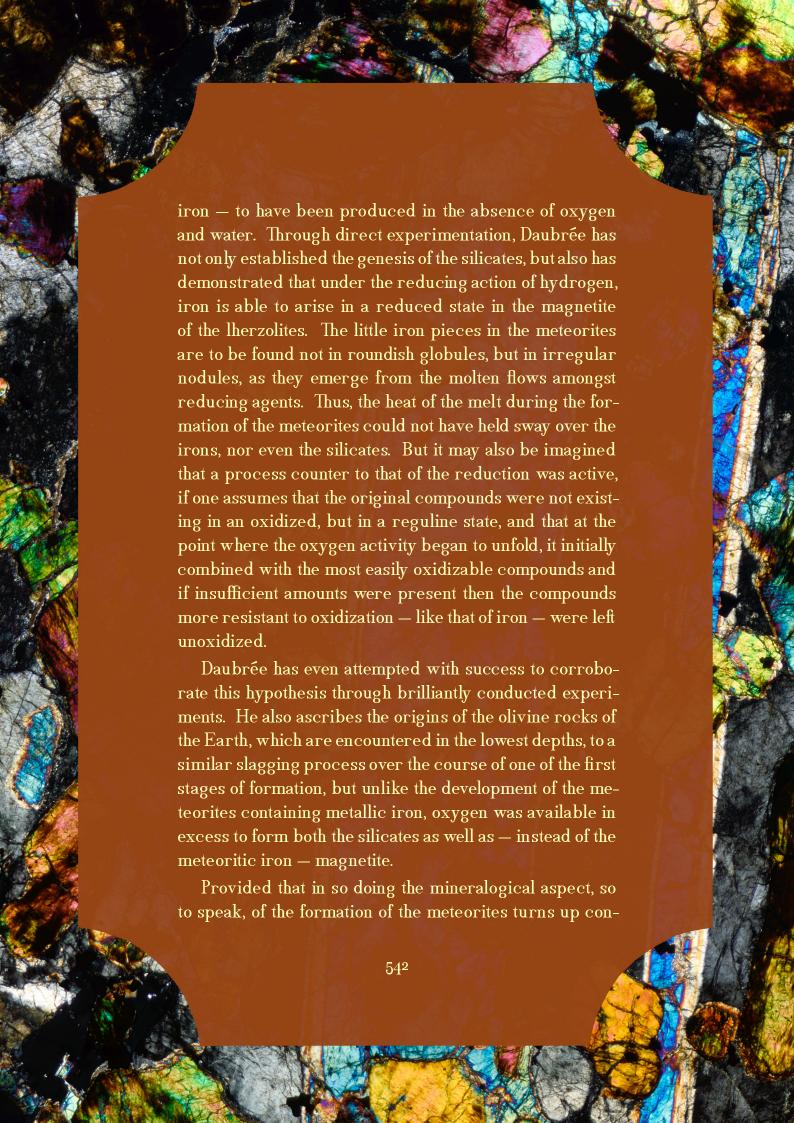


with a darker envelope that is dissolved by acids, while the latter resists. Highly curious are the bowl-shaped constructions, which seem to be meteoritic iron, which are generally only spread over a small part of the globules. The same unilateral striations, visible on the average as crescent bowed streaks, also appear inside the chondrules and provide strong evidence contrary to their being formed by a tumbling of some material, the entire arrangement of the tufted structure speaks to a resolution against their origin by tumbling.30 However, not all chondrules are the eccentrically fibrous type; many, especially the smaller ones, have a fine-grained composition, as if they are composed of a mass of aggregated dust. Here too, the one-sided formation of the spheres is sometimes noticeable by an intensely greater compression of the dust pieces. Finally, as far as the external shape of the tiny meteoritic iron and ferrous sulfide parts admixed with the chondrites is concerned, we do not notice any regular design at all in these either, neither in little strips corresponding to the nature of ilmenite, for instance in diabase, nor in roundish spherules; isolating the meteoritic iron is easy via a light crushing of the stony mass and extraction with the magnet, with this it is revealed that the surface of the small meteoritic iron pieces is powdery, as though coated over by tiny adhesive mineral particles. In general, they are erratically shaped little pellets and nodules, which frequently proceed in fine serrations and delicate granular ramifica-<sup>30</sup> Also, the chondrules drawn by Richard von Drasche of the meteorite from Lancé ([Gustav] Tschermak's Mineralogical Reports, 1875, Vol. 5, Issue 1) exactly match, in reference to the inner structure and outer form, our depiction. 538

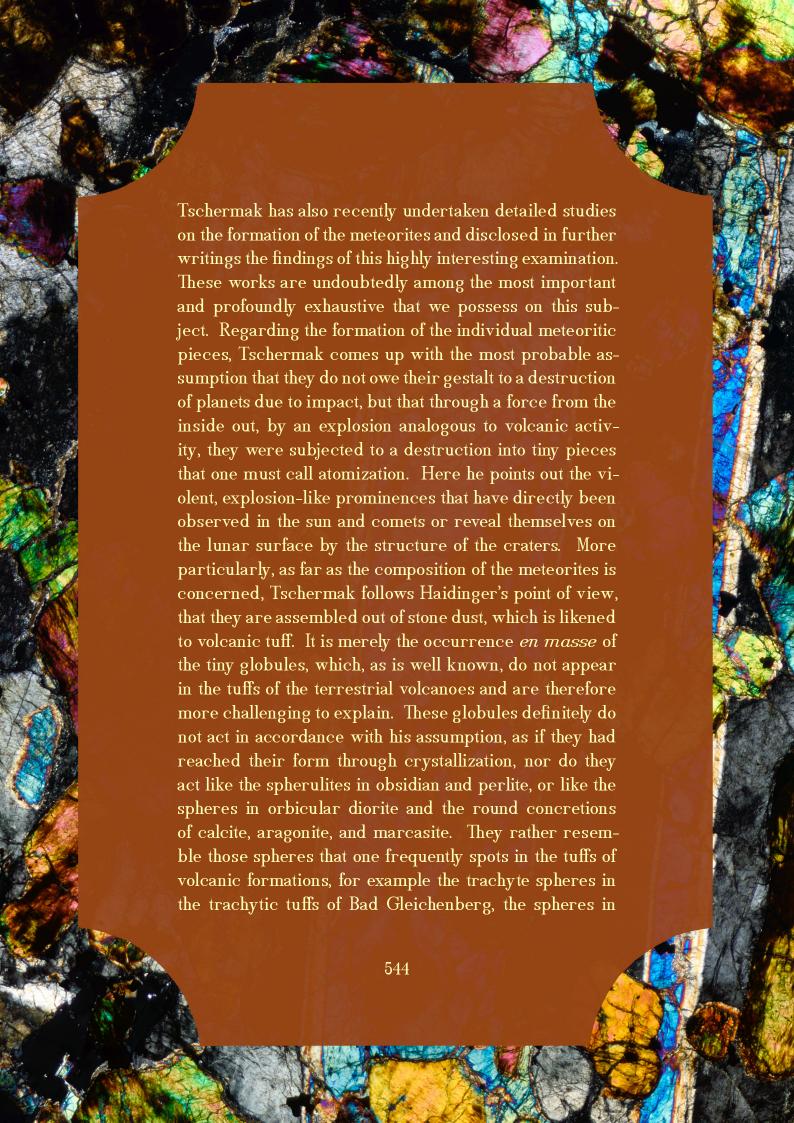




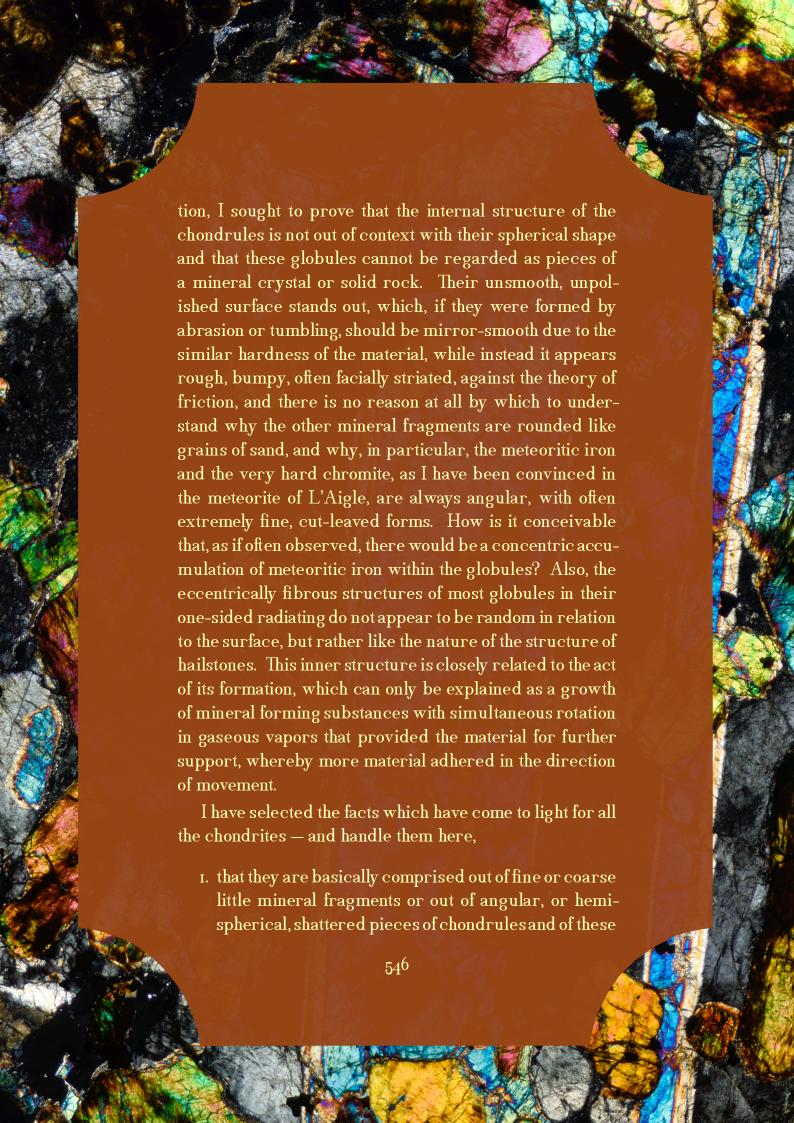


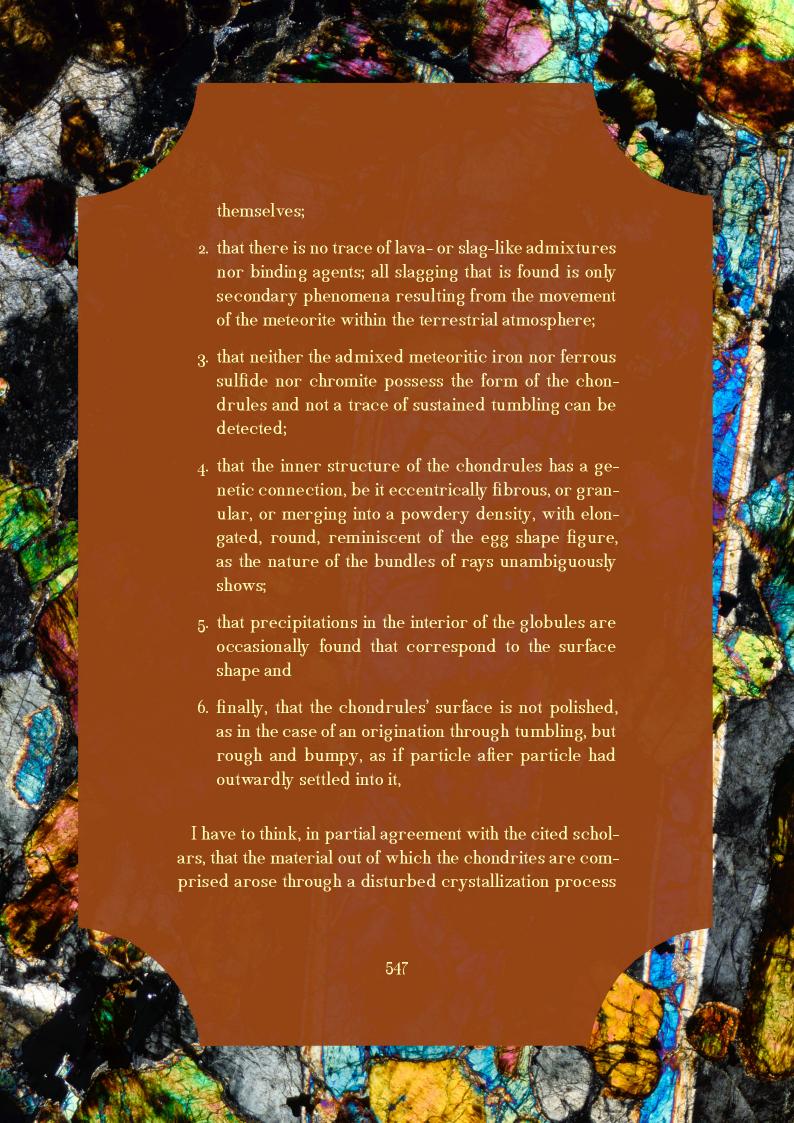


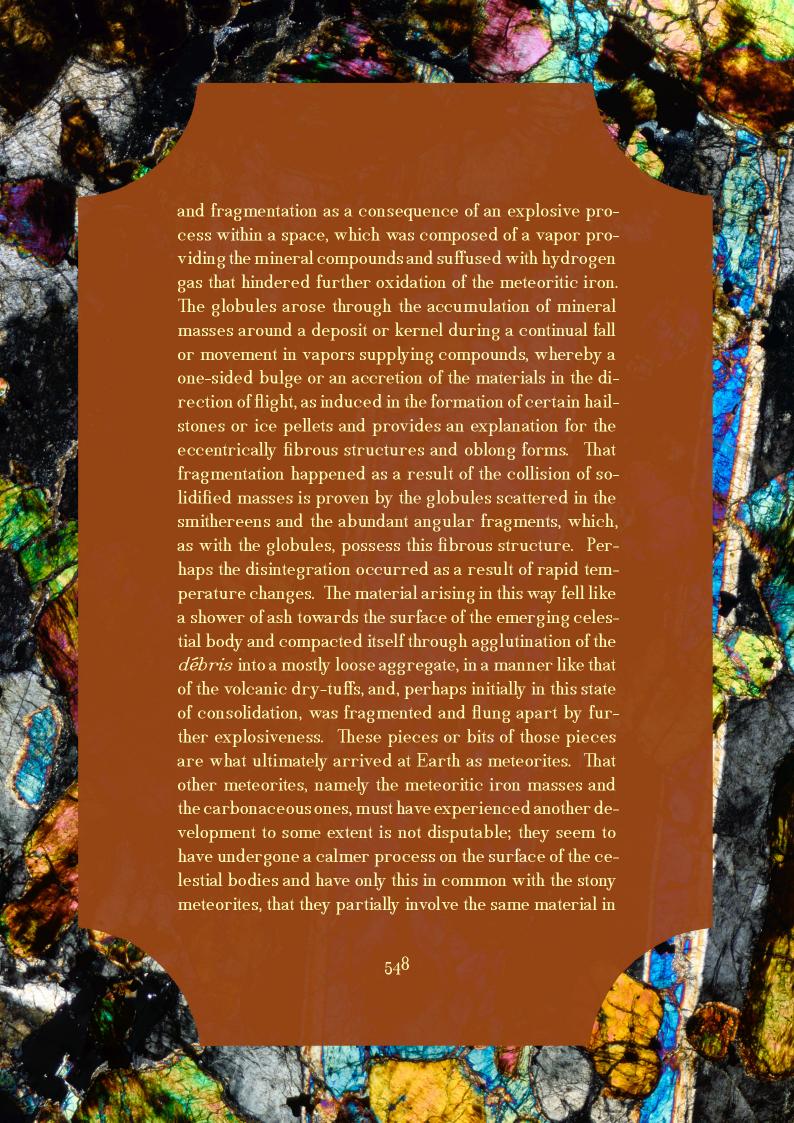
firmed, the uniquely shattered structure of the chondrites calls for further consideration. We learn from a more recent publication of Daubrée's<sup>34</sup> that he conceived of the origination of the chondrules as analogous to the deposition of olivine globules during one of his trials, in which he had melted olivine blended with coal. The comparison would be more comprehensive if the reduction process took place due to hydrogen. Only the other day did a very distinguished scholar on meteorite knowledge,<sup>35</sup> upon chance during the discussion on the subject of the peculiar breccia-like structure of the meteoritic iron from Santa Catharina, say moreover, that the fragmentation of the materials cohering the stone meteorites must be considered as an explosive effect from very compressed gases, perhaps such as it occurs from the application of dynamite. But concerning the formation of the chondrules, he refers to the trial cited above, whereby a kind of granulation gets conducted at the moment in which the substance solidified. Though most often the chondrules seem to him to be simple fragments, which are rounded down due to abrasion, such as arrived at in the investigation of these globules by Gustav Rose (paper in the Academy of Sciences in Berlin for 1862, p. 97 and 98) and clearly set forth by [Stanislas-Etienne] Meunier regarding a number of meteorites (Comptes Rendus, 1871, p. 346 and Research on the Composition and the Structure of the Meteorites, 1869). Following the procedures of [Wilhelm Carl von] Haidinger, <sup>34</sup> Bulletin of the Geological Society of France, 1, 26a, 1868-9, p. 98 and <sup>35</sup> Comptes Rendus, 1877, No. 27. 543

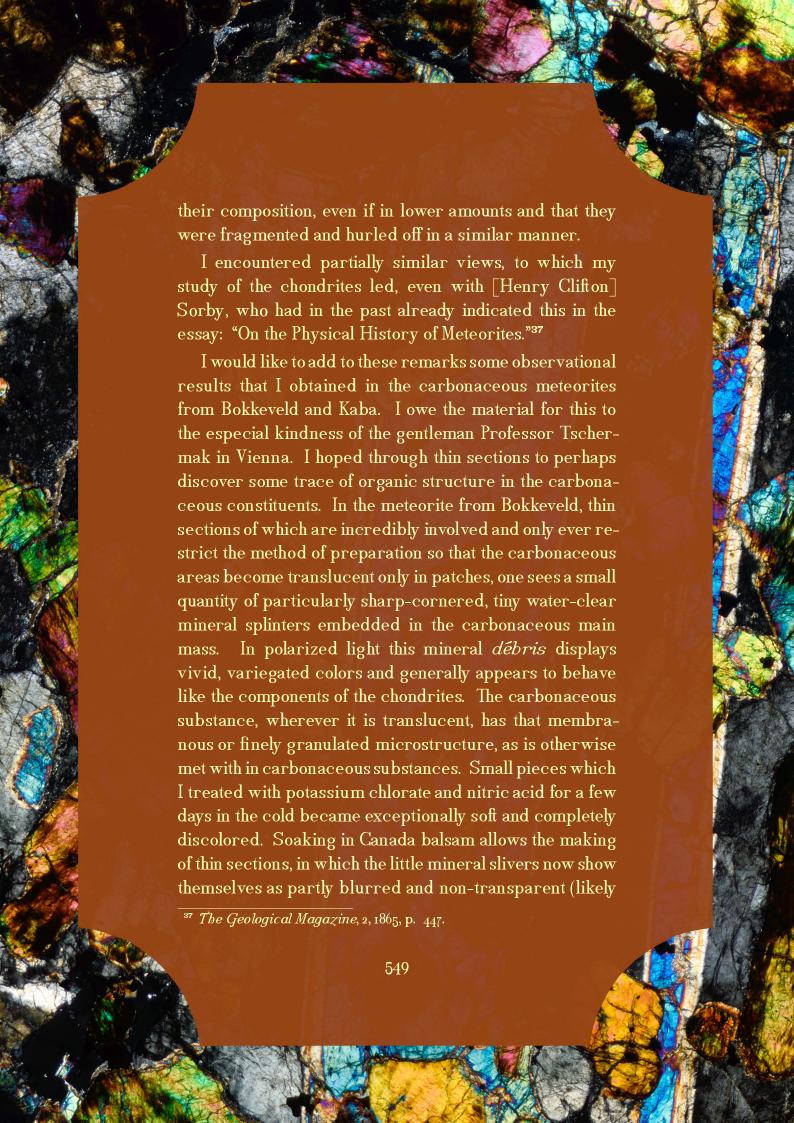


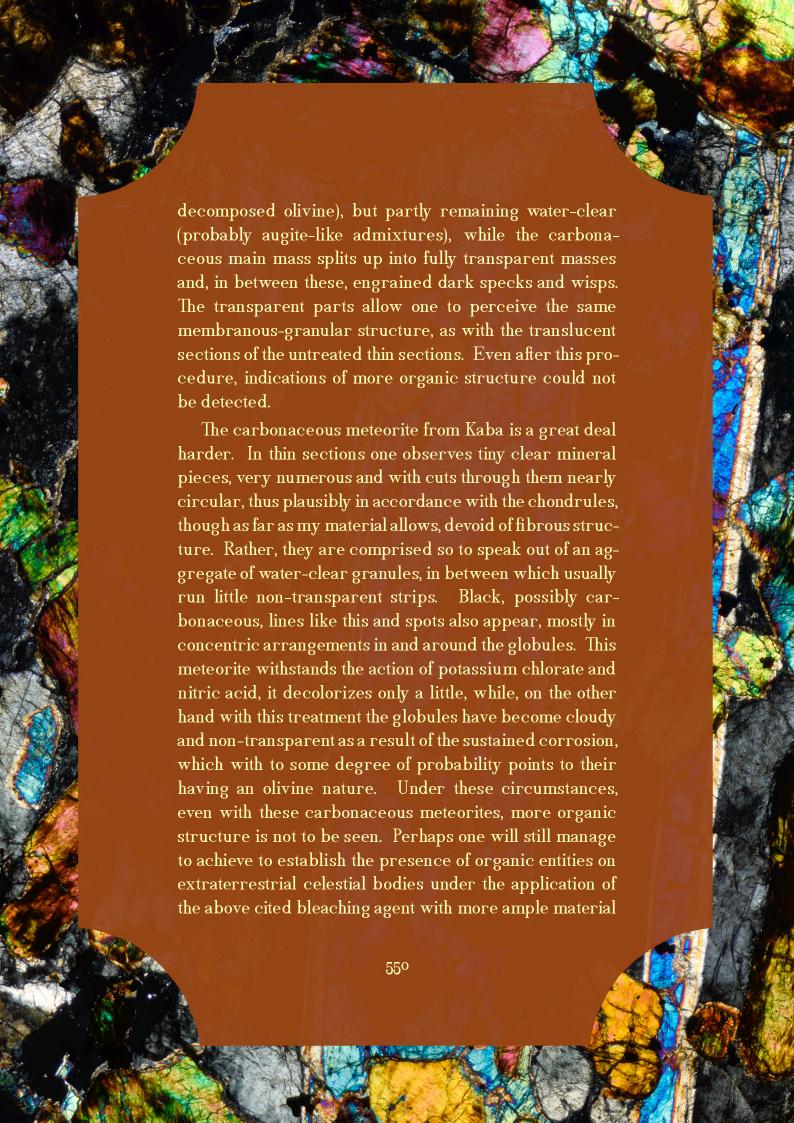




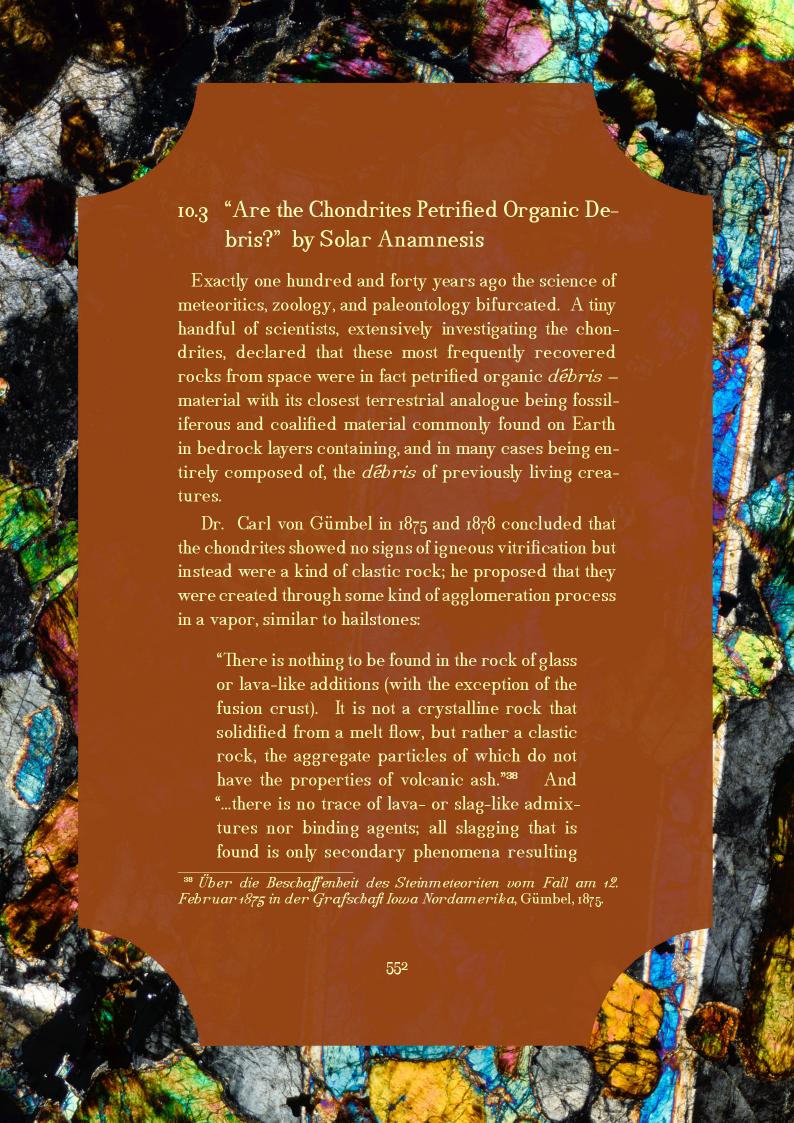


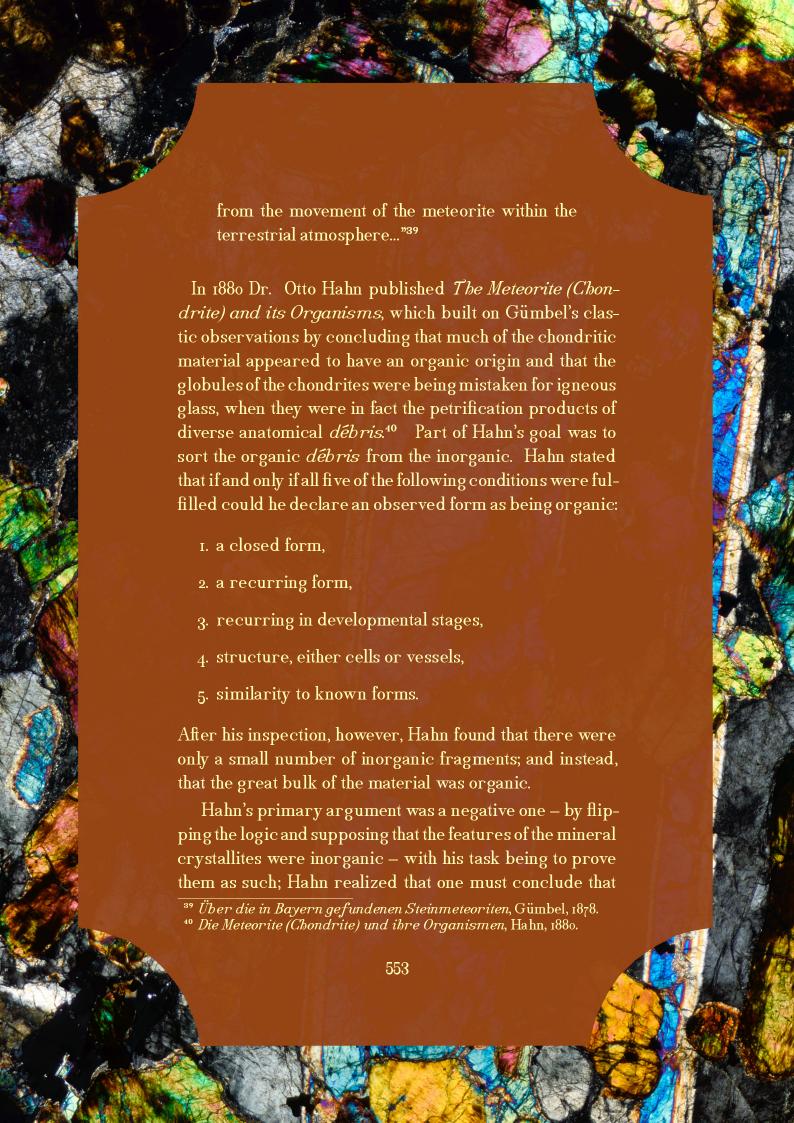












this is impossible based on all known processes of mineral crystallization and so, to maintain the methodological and process principals of petrology and the scientific method, the minerals of the chondrite could only have an organic origin. For instance, one could not invent a new form of rock-matter supposedly unique to a location impossible to sample (planetary nebulae). After proving this line of reasoning he then went on to show how the forms in the meteorite satisfied the five previously mentioned conditions.

After studying hundreds of chondrite thin sections, Hahn concluded that no terrestrial inorganic crystallites could possibly replicate the crystallites observed in the chondrites: they form a finite characteristic set of features with some, but by no means all, of the inclusions being marked by distinct shapes and patterns, such as spheroids and elongated ovals with additional infilling material creating patterns like grates, fans, chambers, some with defined microscopic spicules, with other pieces having all manner of amoeboid-like multifaceted forms, some feathery and skeletal in appearance.

The zoologist Dr. David F. Weinland confirmed the organic nature but rejected the zoological classifications of Hahn in favor of his own set, based on his more experienced observations. Hahn had placed the organisms into three major existing categories: the corals, the sponges, and the crinoids. However, Weinland explained that most of the crinoids were in fact polycystines, and that there might be two or three species of crinoids — in addi-

<sup>&</sup>lt;sup>41</sup> Hahn, 1880.

<sup>&</sup>lt;sup>42</sup> *Das Ausland*, Article 1, Vol. 16, 1881.

tion to the corals and sponges.<sup>43</sup> The result of Weinland's initial work was a paper publishing sixteen novel genera, each with multiple species, and concluding that the total number of species could be close to fifty.44 Weinland concluded that the chondrites must be a kind of primary petrified material, with some chondrite specimens being more fossiliferous than others. It was his practice to search for a pristine specimen within a larger meteorite mass (most chondrite specimens are quite small). By obtaining and then studying these pristine specimens, he was able to better classify the odds and ends found in much greater number.45 Being acquainted with Dr. Hermann Karsten, a biologist, Dr. Weinland convinced him that there were indeed miniature petrified corals within the chondrites. Karsten then wrote *The Meteorite and its Organisms*, in which he stated that such corals were indeed to be found within the chondrites: "...the discovery of organisms in the chondrites, up till now thought to be glass (!!) or a crystallization process, is correct and remains undoubtedly true for any who, with the requisite knowledge, engage in the investigation of these aerolites." He continues: "The forms of the creatures so far recognized in the chondrites are all associated with water: the whole mass of these meteorites seems to have been built underwater, the countless microscopic organisms either petrified retroactively <sup>43</sup> *Das Ausland*, Article 1, Vol. 26, 1881. <sup>44</sup> Über die in Meteoriten entdeckten Tierreste, Weinland, 1882. <sup>45</sup> Weinland, 1882. 555



He stated that a single organic specimen found in the chondrites would be a counterexample to the entire theory of glass as the explanation for the forms of the chondrites. He based his entire opposition to Hahn and Weinland on a single meteorite with only a few cuts and fragments.<sup>48</sup> Dr. Carl Vogt, in 1882, wrote a lengthy essay: The Alleged Organisms of the Meteorites, which included hand drawn illustrations, in an attempt to disprove Hahn's theory by proving that the forms of chondrites could easily be reproduced synthetically. He took the side of the opponents who claimed that the chondrules were inorganic glass crystallizations with a kind of encrusting material – readily produced by artificial means through the melting of the chondritic material. Vogt provided several illustrations showing such artificially produced chondritic material and patterns. 49 But if Vogt and his colleagues had artificially created the chondrites, then how could they have remained a mystery until the modern time? Studying Vogt's work and illustrations reveals that he either did not address or was not aware of the more interesting and peculiar features of the chondrites. No further work was published to support Hahn, Weinland, and Karsten after 1881 and they were apparently forgotten by history. In the intervening years there has been little to no mention of their organic theory. In 1916 Dr. Randolph Kirkpatrick stated in his Nummulosphere that the chondrites were fossiliferous – although he rejected Hahn because Hahn had not gone far enough in his conclusions.<sup>50</sup> <sup>48</sup> *Das Ausland*, Article 4, Vol. 37, 1881. <sup>49</sup> Les Prétendus Organismes des Météorites, Vogt, 1882. 557

In the 1950's Sir Fred Hoyle proposed that interstellar dust clouds could be composed of freeze dried bacteria based on light spectrum observations.<sup>53</sup> Dr. Chandra Wickramasinghe continued and expanded the work of Hoyle and wrote numerous books in support of the theory of panspermia.<sup>54</sup> In recent times, Dr. Richard B. Hoover has found microscopic evidence of organic structures, including cyanobacteria and diatoms, in carbonaceous chondrites.<sup>55</sup>

Meteorites containing organic structures could be:

- I. Living material directly ejected from a parent body– freeze dried and vacuum preserved.
- 2. From fossiliferous, or fossil containing, layers laid down during previous geological eons which took place on Earth or potentially another planet harbouring life (perhaps even a moon or dwarf planet) and later ejected through physical collisions.

<sup>&</sup>lt;sup>50</sup> *Nummulosphere*, Kirkpatrick, 1916.

<sup>&</sup>lt;sup>51</sup> On Chondrules and Chondritic Structure in Meteorites, Merrill, 1920.

<sup>&</sup>lt;sup>52</sup> Claus, G., and Nagy, B., *Nature*, 192, 594 (1961).

<sup>&</sup>lt;sup>58</sup> Evolution from Space: A Theory of Cosmic Creationism, Hoyle, 1084.

<sup>&</sup>lt;sup>54</sup> The Search for our Cosmic Ancestry, Wickramasinghe, 2015.
<sup>55</sup> "Microfossils of Cyanobacteria in the Orgueil Carbonaceous Meteorite," Hoover, 2011.



